#The Chemical Age

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An Awakening to the Truth

THE nation now knows in detail the exact measure of the financial sacrifice which the National Government demands of it in order that irretrievable disaster may be averted by the balancing of the Budget. The taunts and jeers with which a considerable section of the Opposition greeted Mr. Snowden's supplementary Budget statement will find no echo in the responsible part of the community which, besides being called upon the pay the larger part of the bill, has accepted the duty of providing work for British hands in those factories and business houses which still remain under private control. The trading community has shown before that it can face facts, however unpleasant, and there is no question of its failing in the present emergency. The facts are grim enough in all conscience. All the rainbows which each political party in turn has been chasing since the war have been shattered by one sentence uttered by the Chancellor of the Exchequer. He solemnly informed the House of Commons that he was faced with a deficit on the national accounts for the present financial year of £75,000,000, and with one of £170,000,000 for 1932–33. Such an appalling prospect was calculated either to cause a panic, or to steady the nation for an effort never before asked of it in peace time. The fact that there has been no panic is to a large extent attributable to the instinctive feeling of the nation generally, that the manufacturing and trading classes will honour the bond presented to them by the National Government.

What has happened is a return to political sanity by a decision in favour of national solvency. The facts and figures which Mr. Snowden marshalled were decisive for every practical man of affairs, and some of his general reflections ought never to be forgotten by the generation to which they were addressed. We now have it on the highest possible authority that nationally we have for some time been living beyond our means and to a considerable extent upon our capital. The national income has been falling rapidly. Profits upon which national revenue must largely depend have fallen 20 per cent. during the last two years and in many industries wages are being paid out of capital. Our total national and local taxation is now very near one-third of the total national income. It does not require much imagination to see that a situation expressed in terms never before addressed to the House of Commons can only be met by measures so drastic as to establish new precedents for those who make the laws and those who obey them. What is demanded above everything else is a renunciation of the economic fallacies which have brought the nation to the fringe of disaster and a determination to re-establish British credit on the only sound principle of business, that of wise economy which insists on securing value for value.

The National Government has shown rare courage in its effort to restore the soundness of British finance in the face of the world. The task cannot fail to have been a disagreeable one, inasmuch as every Minister was in effect surrendering a theory here and a policy there to which he had publicly pledged himself in other times. The prospective deficit is being wiped out partly by economies and in an even higher ratio by new taxation. If it had been possible to make an immediate and complete return to the principles of sound finance there should have been no new taxes at all. In all the circumstances that was not to be expected, but it is decidedly disappointing to find the biggest burden placed upon the taxpayer and therefore in the long run upon industry. The business community had already an almost insupportable load to carry on its shoulders, and another sixpence on the income tax will make conditions still more difficult. There will be a few millions less available for the development of private trade, and a certain diminution in the spending power of the main body of taxpayers. It is ironical, too, that the great majority of men and women in the class whose interests the present Opposition is noisily championing, are not forced to make any real contribution towards a solution of the crisis. The £3 to £4 a week married artisan who is the backbone of the Trade Union movement will still escape direct taxation,

and has the option of refusing to pay the additional taxes on luxuries.

Though at the moment the burden on the business man will be actually heavier than before, he will not be found to complain on that account. He will pay the new taxes more cheerfully than he paid the old ones and will put his shoulder to the wheel with a renewed zeal which should in itself secure better trading results to balance the increase of his compulsory outgoings. He will do this because he, at last, sees a prospect of better times. It is possible for the first time for a good many years to see economic daylight. There has been a general awakening to the truth of the doctrine that public economy is the sure road to private prosperity. The shock of the crisis has given millions of men and women, who never gave a thought to the matter before, a liberal education in the basic principles of national finance, on which the fruits of their industry directly depend. The pound sterling is seen to be the vitally important factor in the national welfare, and there is a wider recognition than before of what money means in terms of purchasing power. The business man accordingly, notwithstanding his new burdens, breathes again. He rejoices that the right road has at last been taken, and regarding the economies in public expenditure announced in the supplementary Budget as only a first instalment, he looks forward with confidence to a revival of trade and the restoration of prosperity.

Faraday the Discoverer

ON Monday next scientists and industrialists gather in London to commemorate the centenary of Michael Faraday's discovery of electromagnetic induction. Not by accident did Faraday find that a momentary current of electricity flowed along a wire when a magnet approached or withdrew from it. It resulted from a purpose clear in his mind, and which he felt convinced would ultimately spring from his continued experiments in electromagnetism. So, too, it was with Faraday's chemical discoveries; failure attended repeated experiments, but he never abandoned hope, and it was due to his persistent spirit of research that the world was earlier the richer for benzene—a simple liquid which has grown to such importance in building up parts of our present-day chemical industry. If Faraday had not discovered benzene, it might be argued that this discovery would undoubtedly have been made by someone during subsequent years. Our present age is an age of intensive research in nearly all branches of industry, but Faraday lived one hundred years ago and during those years science has made great progress. It was to the Royal Institution in Albemarle Street that Faraday came in 1813, a youth of twenty-two, to become assistant to Sir Humphrey Davy, where later he succeeded Davy as director, and where he lived and worked and gave his famous lectures throughout an active life. Here he took up the work begun by Davy and established in that Institution the tradition of scientific research which has been followed in it down to the present day. He was an able and careful experimenter. His diary, in which experiments are recorded in minute detail, is ample testimony to his aims in life and his work.

Price Cutting in Bromides

A FIERCE price cutting campaign is now in progress between the British and Continental makers of bromides. Briefly the position is that up to quite recently the British makers were dependent on the Franco-German bromine ring for their supplies of bromine, and the ring so controlled the price of bromine as to make it very difficult for British makers to offer any real competition with the ring abroad in regard to bromides. With Palestine's supplies of bromine coming into the market the British makers are therefore exerting a praiseworthy attempt to cut adrift from the bromine ring and to rely on bromine from what may be regarded as a British source. In consequence, the foreign ring is now indulging in intensive dumping and price cutting with the obvious object of defeating the British manufacturers. It is in the national interest that such dumping should not succeed, and British users of bromides should do everything in their power to support the British makers in their fight with the foreign combine.

Overseas Chemical Trade

THE Board of Trade returns for overseas trade during August show a further decline in chemical exports in comparison with the figures for August, 1930. The amounts involved are £1,117,125 and £1,515,778 respectively, showing a decline of £398,653, or 26·3 per cent. During July the decline was only 21·5 per cent. below July, 1930. Chemical imports at £1,058,011, on the other hand, have remained at a more or less constant level during July and August of this year, being only about 11·5 per cent. below those for the corresponding months of last year, imports during August, 1930, being £1,194,669. In regard to re-exports, it is to be noted that the decline here is £17,401, as compared with August, 1930, or about 25·3 per cent., a figure almost identical with the decline in the exports which are of domestic manufacture. The effect of the suggested tariffs, so far as they will affect overseas trade in chemical products and manufactures, it is difficult to anticipate, but it is already reported from the Continent that manufacturers there are showing distinct signs of unrest at the prospect which is in view, particularly in Switzerland.

The Calendar

Sept. 21–23	Royal Institution: Faraday Celebrations	London.
23-25	Institution of Mining Engineers: Summer General Meeting.	Manchester.
23	Institute of Fuel: "The Reactivity of Coke. J. G. King and J. H. Jones.. 6 p.m.	Burlington House, London.
23–30	British Association Centenary Meeting.	London.
23 to Oct. 3	Faraday Centenary Exhibition. 11 a.m 10 p.m.	Albert Hall, London.
Sept. 25	"The Rise and Early Development of Electroplating." Dr. R. S. Hutton. 3.30 p.m. "Electro-deposition and the Engineer." D. J. MacNaughtan. 7.30 p.m.	Albert Hall, London
27	Eleventh Congress of Industrial Chemistry.	Paris.
Sept. 29–Oct. 2	Iron and Steel Institute: Autumn Meeting.	Swansea.

Faraday's Contributions to Chemistry

By Lyman C. Newell

The following extracts are taken from a paper read before the Division of the History of Chemistry at the 81st meeting of the American Chemical Society, at Indianapolis, March 30–April 3, 1931.

DURING the early years of his connection with the Royal Institution, Faraday worked almost exclusively in the field of chemistry, and made several major contributions to this science. About 1830 and thereafter, his investigations were mainly in electricity and magnetism, though he did some epochal work in electro-chemistry, liquefaction of gases, and colloids. An interest in chemistry, however, was maintained throughout his long career, and for over thirty years he was professor of chemistry in the Royal Institution.

For upward of ten years, Faraday acted as a private assistant to Davy and as lecture assistant to both Davy and Brande. When Davy retired in 1825, Faraday practically assumed control of the chemistry at the Royal Institution. He at once plunged into chemical investigations long held in the leash and also established several lecture courses in chemistry which have continued to the present day. For about seven years he had merely served as an assistant, but now his apprenticeship was over. He had won his freedom and could work untrammelled as his genius impelled. Moreover, he was encouraged to investigate and publish because early in 1824 he had been elected a Fellow of the Royal Society. During the preceding five years and within the following five, we find he made fundamental contributions to chemistry, *e.g.*, the discovery of benzene (C_6H_6), the liquefaction of gases, optical glass, and alloys of steel. During this period he also performed experiments in electricity and magnetism which culminated in 1831 in his epochal discovery that electricity can be derived from magnetism, whilst in 1833, John Fuller, a member of the Royal Institution, founded the Fullerian Professorship of Chemistry, and Faraday was appointed to this position for life. Thus within twenty years Faraday had risen from a menial position to the highest place in the Royal Institution.

[*By kind permission of the publishers of "Nature."*]

Early Chemical Investigations

Faraday's early contributions to chemistry were published in the *Quarterly Journal of Science*, which was issued soon after the Royal Institution was launched. The early volumes of this journal were nominally edited by William T. Brande, who was professor of chemistry at that time, though Faraday helped him and doubtless did much of the work; in fact, at times, according to certain correspondence, he did all of the editing. They contain many articles on chemistry by Faraday from 1816 to 1826. The first was the one on the analysis of native caustic lime. This article was "sent in" by Faraday and incorporated in a series of short communications by Davy, but is credited to Mr. Faraday, Assistant in the Laboratory of the Royal Institution, being supplemented by some "Observations" by Davy. Upward of thirty articles followed regularly during the next ten years, and with few exceptions they were on some chemical investigations conducted by Faraday. These articles dealt with a wide range of subjects, including the escape of gases through capillary tubes; the solution of silver in ammonia; sulphuret of phosphorus; combinations of ammonia with chlorides; gallic acid and tannin; separation of iron and manganese; analysis of Indian steel; decomposition of chlorides by silver, hydrogen, and zinc; carburetted hydrogen; the combustion of the diamond; nitrous oxide; carbon chlorides; hydrate of chlorine; liquefaction of gases; fluid chlorine; fumigation; tests for nitrogen in minute quantities; crystals of lead chromate, etc.

The Forerunners of Stainless Steel

Faraday's first long investigation was on alloys of steel. It was begun in 1820 in collaboration with a surgical instrument maker named Stodart, and was continued about two years. The primary object was to make modifications, or alloys, of steel suitable for surgical instruments, though the field widened as the work progressed. Faraday hoped a non-rusting alloy might be made by alloying steel with certain metals, *e.g.*, silver, platinum and its congeners, or nickel, but the nickel steel he made was found to be more readily oxidised than ordinary steel. The platinum steel, too, did not possess the desired properties. Silver steel proved more promising, though only a small percentage of silver could be incorporated in the alloy. The alloys of steel with iridium and rhodium were likewise disappointing. The research as a whole was not profitable as far as the primary object was concerned. Silver steel was used for a time by a manufacturer of fireplace fittings, and some of the other steels were made into razor blades, which were reported "to cut well."

This research is sometimes referred to as "two years wasted." Looking back over this research and appraising it properly, we cannot, however, agree that it was "two years wasted." First, Faraday demonstrated that small proportions of metals produce surprising effects in the properties of steel—now a fact of wide industrial application. Had other metals, such as cobalt, tungsten, chromium, and molybdenum been available, Faraday would doubtless have anticipated the vast field of special steels and perhaps may have attained his primary object—a non-corrosive or stainless steel for use in surgical instruments, cutlery, and tools. Secondly, Faraday acquired skill as a manipulator and experience as an investigator. In 1820 he was still a beginner in many respects, and the discoveries during the next five years demonstrate unequivocally that during this intensive work on steel alloys, Faraday learned how to plan and conduct a research. Hitherto he had been a promiscuous prober. Now he was an investigator seeking persistently the solution of large problems. Thirdly, he discovered several facts about metals in the course of the investigation, for instance, the easy volatilisation of silver, the difficulty in reducing titanium compounds to the metal, the reticulated surface of an etched alloy of steel and aluminium, and many properties of alloys now commonplace, but then unusual.

Liquefaction of Chlorine

The next systematic contribution to chemistry made by Faraday was on the liquefaction of chlorine and several other gases. His account of this work was embodied in two papers—

"On Fluid Chlorine" and on the "Condensation of Several Gases into Liquids"—which were read before the Royal Society, in 1823. It will be recalled that Davy had shown in 1810 that the substance hitherto called oxymuriatic acid was not a compound but a simple substance—and he gave the name chlorine to the element. Davy also showed that the solid prepared by Berthollet and called by him solid chlorine was really chlorine hydrate ($Cl_2{\cdot}8H_2O$). It was natural that Faraday who was closely associated with Davy should likewise be interested in chlorine, particularly in view of the hazy knowledge of the element. It is probable that Faraday's natural dislike of "doubtful knowledge," led him to re-examine chlorine hydrate. He analysed it and the results were published in the *Quarterly Journal*. Davy, without stating the results he thought might follow, suggested that the hydrate be heated under pressure in a sealed glass tube. Faraday did so. As a result, the tube became filled with a green-yellow gas, which, on cooling, separated into two liquids. Faraday found one to be water, and the other chlorine. What had happened was that the water and chlorine had separated, and the chlorine gas not being able to escape, had condensed into the liquid form. To prove that the oily liquid was really chlorine and contained no water, Faraday subsequently put dried chlorine into a tube, cooled it to a low temperature, and obtained liquid chlorine.

Grasping the significance of the liquefaction of chlorine, Faraday continued this line of work and succeeded in liquefying sulphurous acid, hydrogen sulphide, carbon dioxide, euchlorine (a gas obtained from potassium chlorate and sulphuric acid), nitrous oxide, cyanogen, ammonia, and hydrochloric acid—the last a repetition of Davy's experiment. In these experiments he used a simple and ingenious apparatus. He condensed the gas in a closed tube, bent at right angles, like the one which he had used for chlorine. The end of the tube which contained the substance was heated, while the other end was cooled. His attempts to liquefy hydrogen, oxygen, and some other gases, however, were unsuccessful.

Discovery of Benzene

The next conspicuous work of Faraday resulted in the discovery of the two hydrocarbons, benzene and butylene, *o*- and *p*-dichlorobenzene, nitrobenzene, and chlorine derivatives of butylene. This composite discovery was described in a paper read by Faraday on June 16, 1825, at a meeting of the Royal Society. The raw material from which Faraday separated benzene was an oil obtained as a by-product in the manufacture of an illuminating gas by the destructive distillation of fish oil. Several years prior to 1825 the Portable Gas Co., of London, manufactured this illuminating gas by dropping whale, or cod, oil into a hot furnace, subjecting the gaseous product to a pressure of about thirty atmospheres, and storing the purified gas in portable vessels for use in public buildings and private houses. During the compression an oily liquid was deposited. It was from this liquid that Faraday obtained benzene and butylene. He soon found that this oil was a mixture, and decided to subject it to fractional distillation.

In his own words, he says: "with the hope of separating some distinct substances from this evident mixture, a quantity of it was distilled, and the vapours condensed at a temperature of 0° into separate portions, the receiver being changed with each rise of 10° in the retort and the liquid retained in a state of incipient ebullition. In this way a succession of products was obtained; but they were by no means constant; for the portions, for instance, which came over when the fluid was boiling from 160° to 170°, when redistilled, began to boil at 130°, and a part remained which did not rise under 200°. By repeatedly rectifying all these portions, and adding similar products together, I was able to diminish these differences of temperature, and at last bring them more nearly to resemble a series of substances of different volatility."

Faraday separated his "bi-carburet of hydrogen" by freezing it out from the fraction boiling at 176–190° F. Next he found the physical constants, and the values he obtained are remarkably close to those accepted to-day. He noted that it burned with a bright flame and much smoke, formed an explosive mixture with oxygen, gradually deposited carbon, and yielded carburetted hydrogen gas when passed through a red-hot tube. Regarding its action with chlorine, he says: "Chlorine introduced to the substance in a retort exerted but little action until placed in sunlight, when dense fumes were formed without the evolution of much heat; and ultimately much muriatic acid was produced, and two other substances, one a solid crystalline body, the other a dense thick fluid." The solid was undoubtedly *p*-dichlorobenzene and the liquid the ortho-isomer, but he did not examine them.

Regarding the action with nitric acid and sulphuric acid, he says: "Nitric acid acted slowly upon the substance and became red, the fluid remaining colourless. When cooled to 32°, the substance became solid and of a fine red colour, which disappeared upon fusion. The odour of the substance with the acid was exceedingly like that of almonds, and it is probable that hydrocyanic acid was formed. Sulphuric acid added to it over mercury exerted a moderate action upon it, little or no heat was evolved, no blackening took place, no sulphurous acid was formed; but the acid became of a light yellow colour, and a portion of a clear colourless fluid floated, which appeared to be a product of the action. When separated, it was found to be bright and clear, but not affected by water or more sulphuric acid, solidifying at about 34°, and being then white, crystalline, and dendritical."

Hexachlorobenzene

Faraday discovered several chlorides of carbon. In 1820 he isolated a compound which was undoubtedly hexachlorobenzene. The next year he published an article giving an account of the discovery of two chlorine derivatives of ethylene. By treating Dutch liquid (ethylene chloride) with chlorine in the sunlight, he obtained a white, crystalline substance, which he showed by analysis was a chloride of carbon free from hydrogen. Faraday called this compound "perchloride of carbon." Later it was called "etherosic chloride" or "carbon sesquichloride." It is our hexachloroethane, C_2Cl_6. Shortly afterward, by passing the perchloride through a hot tube, he obtained a liquid which he called "protochloride of carbon." It proved to be a compound of carbon and chlorine, but in different proportions from the first one, and it also had a different specific gravity. In the first compound the proportions of carbon to chlorine were 2 to 3, and in the second 1 to 1. These give in his formulation C_2Cl_3 and Cl. Translated into our formulas, they become C_2Cl_6 and C_2Cl_4.

Electrochemical Researches

One of Faraday's major contributions to chemistry was the set of facts which led to the law bearing his name, the law connecting the amount of electricity involved in quantitative electrochemical changes. Faraday's first commonplace book indicates that he was interested in experimental electricity about the time he began to work at the Royal Institution and his early notebooks reveal his profound grasp of the fundamental questions provoked about that time by the baffling field of electricity and magnetism. Moreover, he was the institutional heir to Davy's discoveries of the fundamental relation between current electricity and chemical change. The isolation of sodium and potassium from their bases by the action of a current from the big battery of the Royal Institution had been accomplished only ten years before on the very spot where Faraday worked and reflected. While it is a fact that from 1816 to 1826 his major field of interest was chemistry, it is likewise true that during this period he attacked the alluring field of electricity and magnetism. His early published articles on electricity are few but his notes are extensive. We find in his notebooks and letters many stray entries hinting at his eagerness to abandon the tedious, time-consuming researches on steel and glass in order to follow up promising experiments in magnetism and electricity. It is generally known that these experiments reached a peak in 1831, when Faraday discovered electromagnetic induction, and thereby made possible the invention of the induction coil and the electromagnetic machines that led to the invention of the modern dynamo.

Regulations for Asbestos Factories

The Home Secretary proposes to make regulations in pursuance of the powers conferred upon him under Section 79 of the Factory and Workshop Act, 1901, for the protection of the workers employed in certain processes involving exposure to asbestos dust. Copies of the draft regulations may be obtained on application to the Factory Department, Home Office, London, S.W.1. Any objection by or on behalf of any person affected thereby must be sent to the Secretary of State within 30 days.

British Association Centenary

Arrangements for the Chemistry Section

ADDITIONAL information is now available regarding the discussions for the Chemistry Section of the British Association, which holds its Centenary meeting in London, September 23-30.

The Presidential Address

In his Presidential address to the Section on Thursday, September 24, Sir Harold Hartley will review Faraday's early chemical work and the experiments which led, step by step, to the discovery of the laws of electrolysis. Numerous extracts will be quoted from Faraday's notebook, showing the manner in which the investigation progressed and the various steps and critical experiments by which he was led, with unerring judgment, to the ultimate formulation of the laws which have stood the test of 100 years intensive research on the subject of electrolytic phenomena. This will constitute an admirable demonstration of how scientific investigations should be conducted. Sir Harold will then review, in chronological order, the various developments that have taken place in the study of electrolytic conduction during the last century.

Discussion on Vitamins

The discussion on "The Chemistry of the Vitamins and Related Substances" on Friday, September 25, in which many distinguished foreign guests are participating, promises to be of exceptional interest, as during the past year noteworthy advances have been made in our knowledge of these all-important dietary factors. This session will be opened by Sir F. Gowland Hopkins, President of the Royal Society, to whom we owe the discovery of the vitamins. Following upon this, a discussion on vitamin A, the growth-promoting and anti-infective vitamin, will be inaugurated, in which Professors P. Karrer (Zurich), H. von Euler (Stockholm), R. Kuhn (Heidelberg), J. C. Drummond and I. M. Heilbron, and Drs. R. A. Morton and T. Moore will take part. The relation of the vitamin to the orange pigment carotene which is present in minute quantities in all grasses, also carrots and red palm oil, will be discussed. The subject of vitamins B and D will be introduced during the afternoon session.

Symposium on British Fuel Problem

The symposium on "The British Fuel Problem" takes place in the Grand Hall of the University on Monday, September 28. Sir David Milne-Watson, Governor of the Gas Light and Coke Co., and President of the Institute of Fuel, will deal with coal; Sir John Cadman, chairman of the Anglo-Persian Oil Co., with oil; and Mr. H. T. Tizard, Rector of Imperial College, South Kensington, with future possibilities. Sir David Milne-Watson will deal with the causes of the present disparity between production and demand in the coal industry, and will indicate the position in regard to this country's oil requirements. Sir John Cadman, in his address, will speak on the main developments which have taken place in the use of petroleum during recent years, and the general characteristics of oil as a source of motive power. The origin, growth and development of the petroleum industry will be traced, and the world's petroleum will be considered from the point of view of the possible exhaustion of supplies. In discussing future possibilities, Mr. Tizard will point out that all the indications tend to show that the home consumption of coal will continue to diminish even when industrial prosperity returns.

Exhibits at Imperial College of Science

During the meeting there will be a series of exhibits in the Physical Chemistry Laboratory at Imperial College, South Kensington, showing the chemistry of thallium; some recent investigations of the chemistry of gold; the chemistry of rhenium; and some recent investigations in the menthone and hydrobenzoin series. In the Department of Chemical Technology, Professor W. A. Bone, F.R.S., is arranging special exhibits and experimental work in connection with researches on (*a*) gaseous combustion at high pressures (including super-pressure bomb in which H_2-air and CO-air mixtures will be exploded at initial pressures of 1,000 atmospheres, (*b*) catalytic reactions at high pressures (including the production of $CH_3OH—2H_2$ mixtures and by the direct oxidation of methane, (*c*) the photographic analysis of explosion flames, (*d*) the chemical constitution of coal, (*e*) blast furnace reactions, (*f*) combustion in electrical discharges, and (*g*) problems in chemical engineering.

Chemistry Section Proceedings

In view of the unique nature of the occasion, being the Centenary meeting, and the importance of the subjects to be discussed, the Organising Committee of the Chemistry Section have made arrangements for the publication of the whole of the proceedings of the Section in full. Normally, only very brief abstracts appear in the printed record of the British Association, with the result that those who are unable to attend the meeting often fail to benefit by the discussions. Applications for the proposed volume (5s., post free) should be made to the local secretary, Mr. J. Davidson Pratt, Association of British Chemical Manufacturers, 166, Piccadilly, London, W.1.

Faraday Centenary Celebrations

Events of the Week

A RECEPTION of delegates to the Faraday Centenary Celebrations will take place in the Lecture Theatre of the Royal Institution on Monday afternoon, September 21, at 3 p.m., followed by an evening Commemorative Meeting at the Queen's Hall, at 8 p.m., when addresses will be given on Faraday's work. The proceedings at this meeting will be broadcast.

* * *

The central feature of the Faraday Exhibition, which will be held at the Royal Albert Hall, open to the public from Wednesday, September 23 to October 3 (11 a.m. to 10 p.m.), will be reproductions and illustrations of Faraday's actual experiments, prepared by the Royal Institution, including a display of some of the historic apparatus. The Institution of Electrical Engineers, the Federal Council for Chemistry, and the representative organisations of the electrical and chemical industries co-operating with them, have undertaken to illustrate by means of special exhibits the full development of electrical and chemical science and industry in all branches which have their origin in Faraday's work. The opening ceremony will be performed by the Rt. Hon. J. C. Smuts, F.R.S.

* * *

The Electroplaters' and Depositors' Technical Society have arranged sections of the Faraday Exhibition so far as the exhibits relate to applications of electro-deposition. On Friday, September 25, two meetings of this Society will be held in the Rehearsal Room of the Albert Hall. At 3.30 p.m. Dr. R. S. Hutton will deliver an address on "The Rise and Early Development of Electroplating," and at 7.30 p.m. Mr. D. J. MacNaughtan will speak on "Electrodeposition and the Engineer."

* * *

Michael Faraday was a Fellow of the Chemical Society from 1842 until his death in 1867, and in the year 1855 presented a number of volumes from his library, including books by Berzelius, Berthollet, Boyle, Cavallo, Glauber, Hales, Higgins, Lavoisier, Macquer and Margraf. This gift was in response to a paragraph in the Report of the Council for the year 1855, in which the attention of Fellows was drawn to the Library "as a place of deposit for curious works upon chemistry, and for pamphlets upon chemical subjects, which, collected, are of great interest, but, separately, are often of little or no value to the possessor." For the period of the present celebrations, the more important volumes are being exhibited in the Library in special showcases. All these volumes contain Faraday's bookplate, and in several instances also bear his autograph.

* * *

On Thursday afternoon, September 24, there will be a garden party at the National Physical Laboratory, by invitation of the Director, Sir Joseph Petavel, F.R.S. Thursday evening will be devoted to a soiree at Burlington House, by invitation of the Council of the Royal Society and its President, Sir F. Gowland Hopkins.

* * *

Faraday's "Experimental Notes," which were bequeathed to the Royal Institution, and have long been its most treasured possession, will shortly be published on behalf of the Institution. These notes are in the form of a diary, in which all his experimental work is recorded in exacting detail, and the complete work will probably run to six or eight volumes.

Thin Films in Relation to Corrosion Problems

By Ulick R. Evans

The following extracts are taken from the Tenth Autumn Lecture delivered to the Institute of Metals on Sunday, September 13, on the occasion of the opening of their Autumn Meeting at Zurich. The author points out that where films do not prevent corrosion they may play a part in deciding the distribution of attack, which takes place preferentially at places where no healing occurs, and that where mechanical action keeps breaking the skin or removing corrosion products at any particular point, attack tends to be localised at the point in question.

It is a matter of common knowledge that when a metal, such as copper or nickel, is heated gently in pure air, the surface shows a series of beautiful colours, due to the interference of light by thin oxide-films on the surface. The range of film-thickness which produces the bright colours may extend from about 400 A to about 3,000 A ($1A = 10^{-8}$ cm.). Films thinner than about 200 A do not cause interference of any light-waves to which our eyes are sensitive; they are, therefore, invisible while in optical contact with the brightly reflecting metal, although they become perfectly visible when removed from the metallic basis. It is these ultra-thin "invisible" films which alter the chemical behaviour of the metal; the slightly thicker films responsible for the colours have often but little protective power, being too liable to cracking.

Increasing Resistance to Tarnish

The part played by protective films is shown particularly well by the work of W. H. J. Vernon on the tarnishing of copper by the sulphur compounds in the atmosphere. Vernon found that, by gently baking his copper, he could increase its resistance to tarnishing. It was not necessary to use a temperature at which the baking produced interference tints; baking at a lower temperature (75° C.) causing no visible change in the appearance, was sufficient to confer this remarkable immunity towards an impure atmosphere. It is probable that—if we except a few metals, such as platinum, gold and silver—most of the metals as we know them carry oxide on the surface, even when they are quite bright. On most metals, however, the oxide produced by the action of air is normally pervious to ions, and the metals become passive or inert only when the metal is subjected to special treatment, which brings the oxide-film into a state of good repair, so that it can prevent leakage. On some materials, however, like aluminium and stainless steel, the oxide normally present has considerable protective power, and the familiar stability of these materials is entirely due to this fact. If we amalgamate alumiuium with mercury, we produce a surface to which the oxide-film does not adhere satisfactorily, and the attack on the aluminium under ordinary conditions becomes quite sensationally rapid. Quite strictly, we ought not to picture aluminium as a "stable" metal at all, but as a highly reactive metal which encases itself in a remarkably water-tight skin of oxide. For many purposes, the natural oxide skin on aluminium is sufficient to prevent damage. On the aluminium alloys, however, the natural skin is less reliable, but it can be improved by suitable oxidising treatment. For instance, in the process of Bengough and Stuart, now widely employed on aircraft alloys, the articles are subjected to anodic treatment in a warm solution of chromic acid.

Isolation of Oxide Films

The case of "stainless steel" with 13 per cent. of chromium is rather similar. Recently the American investigators, Forrest, Roetheli and Brown, studied the corrosion of ordinary steel and stainless-steel specimens when rotated in water containing oxygen. It is instructive to note that then the specimens were initially in a film-free condition, both materials were at first attacked at the same velocity; but in the case of the stainless steel the velocity of attack soon died away, owing to the building up of the protective film, whilst in the case of ordinary steel, the high rate of attack persisted. There is no doubt that the resistance of stainless steel depends on its oxide-skin, and here also pre-treatment with oxidising agents renders the skin yet more resistant. Hatfield, for instance, has shown that if stainless steel is immersed in dilute nitric acid; it afterwards becomes abnormally resistant to sulphuric acid.

In practically all important cases, the oxide-skin has now been isolated. As early as 1920, Seligman and Williams isolated the oxide-film produced on thin aluminium foil by heating at 800° C. When in contact with the metal, an oxide-film of this kind is normally invisible. The heated foil is indistinguishable from unheated foil when examined by reflected light in the ordinary way; but when examined by transmitted light, the heated foil is found to be quite transparent, with a number of opaque beads of unchanged metal held in place between the layers of oxide. By dissolving out this residual metal with hot nitric acid, the experimenters obtained the oxide-film as a mass of colourless iridescent scales. A few years later, Liebreich and Wiederholt described an interesting experiment in which an aluminium wire was rendered passive by anodic treatment in an alkaline solution, and then, on sudden reversal of the current, the film responsible for the passivity peeled off. The method now commonly used for separating oxide-films from aluminium consists in heating the specimen in a current of pure dry hydrogen chloride. This method was originally worked out by Withey and Miss Millar for the analytical estimation of oxide in aluminium at the National Physical Laboratory. The aluminium metal is converted to its chloride, which distils away, leaving the oxide-film unchanged as a thin transparent membrane.

It is important to note that the thicker films consist entirely of oxide, whilst the thinner films contain opaque inclusions of metal in a layer of highly transpareut oxide. In special cases, the amount of metal present in the layer which is separated is so great that the main part of the matter flaking off is opaque, with occasional transparent windows. There is ample evidence that on metal where the oxide layer is of insufficient thickness to give heat-tints there is considerable interlocking between oxide and metal. Instead of a sharp passage from a definite oxide-film to unoxidised metal, the oxide layer seems to send down roots into the metal, so that below the oxide-film proper there is a mixed zone containing both metal and oxide. The reason for this interpenetration is made quite clear by the recent work of Bowden and Rideal, who have shown that on a metallic surface—especially after abrasion—the true area vastly exceeds the apparent area, owing to the presence of cracks penetrating into the surface. Evidently oxygen may pass down these cracks, and thus produce sheaths of oxide extending down into the metal.

Effect of Alloying Constituents

In resisting the more complicated forms of corrosion, protective films play a large part. The effect of small quantities of alloying constituents here requires consideration The idea that a "pure" metal is necessarily more resistant than the same metal containing small amounts of other constituents is inconsistent with the facts. Certain additions —especially of metals which enter into solid solution—may definitely add to the resistance of a metal. Sometimes they modify the primary film; more often they ensure that the film shall be of a self-repairing character, so that if the film is locally damaged by scratching or bending, the corrosion-product produced at a weak point shall be of a nature suited to repair the damage. On the other hand, certain other additions, especially those which cause a second phase to appear in the material, increase greatly the liability of the film to breakdown. Thus, in a study of anodes for use in chromium-plating, a recent research by Baker and Pettibone at the University of Michigan has shown that the dissolution of steel anodes in the chromic acid liquid became smaller as the carbon content of the steel was reduced, whilst electrolytic iron was dissolved less than any steel. These facts point to a breakdown of the film at the junction between carbide and ferrite grains.

In practice, the demand that a film shall be self-healing is of the utmost importance. Recent work suggests that breakdown may occur quite suddenly and spontaneously in a protective film, but the fissure may heal up again almost equally quickly if the conditions are favourable. The same idea was suggested by Vernon's micro-gravimetric work on aluminium,

published many years ago. Whether these breakdowns are truly spontaneous, or are due to internal stresses in the metals, does not greatly matter; for under service conditions the film is liable occasionally to suffer damage due to external causes, such as scratching or bending, or perhaps by the impingement of air bubbles, as suggested by the important researches of Bengough and May on brass condenser tubes. It is essential, however, that any corrosion which commences at a fault in the film should give rise to corrosion product in a form which will repair the damage.

Instances of Self-Healing

Lead is rapidly corroded by a potassium nitrate solution in the presence of oxygen, but is unattacked by a potassium sulphate solution. In the first case, the soluble lead nitrate is produced at the anodic portions, and soluble potassium hydroxide at the cathodic portions. Where they meet they will yield a sparingly soluble body, lead hydroxide, by precipitation; but since this body is produced at a sensible distance from the seat of the attack, it does not bring the reaction to a stoppage. In the second case, the direct anodic reaction converts the superficial portions of the lead *in situ* into the sparingly soluble lead sulphate, and this brings further attack to a close. The protective film of sulphate is very thin—so thin as to be invisible; indeed, it would become visible only if it were of an imperfectly protective character. A faint white layer does appear on the surface, but this is due to a trace of lead hydroxide, and is not the protective film at all.

Another example is the effect of a drop of sodium chloride solution on a zinc surface. Here electrochemical action produces sodium hydroxide at the cathodic portions around the edge, and zinc chloride at the anodic portions in the centre. Where they meet they produce zinc hydroxide, but this is mainly formed as a membranous wall extending out at right angles to the metal. At any rate, the precipitate is formed in a position where it gives no protection. If, instead of one drop, many small drops lie on the zinc surface, the zinc hydroxide is necessarily precipitated closer to the surface. If the zinc is exposed periodically to a mist of tiny salt-water droplets, which settle on the metal and then dry up, zinc chloride and sodium hydroxide will be alternately formed at each spot, and the zinc hydroxide—although a secondary product—will be formed very close to the surface itself. Thus the layer will possess at least some protective properties. This explains why galvanised-iron buildings erected near the sea (exposed intermittently to salt spray) may last reasonably well, whereas sheets of the same galvanised iron, if stacked before erection in a horizontal position on the sea-shore (one resting upon another, so that drops of considerable size may be entrapped between the sheets ond remain there some time before they evaporate), may be found to be already rusty before they are erected.

Anodic and Cathodic Areas

If a piece of metal is immersed in water under conditions of "differential aeration" (that is, with one part shielded from supplies of dissolved oxygen whilst the other part is exposed so that oxygen can be renewed freely to the surface), corrosion will commence as usual at weak points in the primary skin; but the precipitated product will naturally be formed close to the surface at the "well-aerated" part, and far from the surface at the "badly-aerated" part. Thus there will be a general tendency for the weak points to heal up in the well-aerated parts, but for the breakdown to extend in the badly aerated parts. In due course anodic attack will cease at the former, and the cathodic reaction, which requires oxygen, will cease at the latter. In other words, the well-aerated area will become, in general, cathodic, and the unaerated part will become, in general, anodic.

On an immersed specimen of fairly uniform composition, the places where the film is out of repair are the anodic spots, and those where it is in repair are the cathodic areas. This variation in the state of repair can be produced in many ways. The internal stresses left after cutting or bending, and the jagged edges left after certain forms of scratching, alike tend to keep the film in a bad state of repair, and accordingly corrosion usually starts at points where the metal has been cut, bent, or scratched. But in studying this phenomenon experimentally, I have been much impressed by the manner in which the initial distribution of attack—determined by presence of cut edges, bends, jagged points, inclusions, and cavities—gradually passes into a new distribution determined by oxygen distribution, so that, where the mechanical treatment has not been too violent, mechanical effects soon come to be masked by the results of oxygen-distribution. Nor is this really surprising, since in the well-aerated portions the corrosion-products formed at the mechanically produced weak spots will usually be precipitated so close to the metal as to repair the damage. Thus, often when I have attempted to study the effect of localised corrosion produced by bending or scratching, the differential aeration effect has obtruded itself in a way which has been, in point of fact, quite annoying. This has led to the conclusion that, under "service conditions," where no special endeavour is made to keep oxygen concentration uniform, the differential aeration effect will frequently have a rather special importance.

Mechanical Influences

Mechanical considerations, however, will determine the distribution of electrochemical attack under conditions of service where the mechanical damage to the skin at any point is constantly renewed. Thus, if at any point the skin is continually removed by mechanical abrasion, or broken by alternating bending stresses applied to the metal, or pulled away by capillary action (as may possibly occur when bubbles impinge on to the metallic surface, dragging away the skin as they leave the surface once more) anodic attack will remain localised at that point. Thus we get a series of phenomena in which mechanical and chemical action combine to produce rapid corrosion. A specially important example is that of corrosion fatigue in which the two destructive influences (mechanical stresses and chemical corrosion) produce, when acting simultaneously, a destructive effect far greater than either could produce when acting alone. Likewise there are numerous cases known where mechanical erosion combined with chemical attack produces very serious damage. Unfortunately, in such cases the engineer usually attributes the effect to mechanical erosion, and the chemist to chemical corrosion. In a sense both disputants are right, for the mechanical influences play an essential part in the continuous removal of the protective skin, thus allowing the chemical or electrochemical attack to continue.

Fuel Oil from Sharks

A New Industry Foreshadowed

According to a correspondent, in a recent issue of *The Manchester Guardian*, French scientists have been making some interesting experiments designed to reveal whether they can rely on shark oil from the coasts of Senegal and Morocco as fuel for motor transport in case a war again isolates them from normal sources of petrol supply. The extracts from sharks have been proved to yield a good motor oil, with a maximum of combustibility, that leaves no objectionable odour and does not involve discoloration. A specialist in this field has also reported that he found an inferiority of only about 10 per cent. in the best shark fuel oil, as compared with the usual mineral fuel oils, and considers that even that will be overcome by further experimentation with the detail of motors. Already shark leather is coming into commercial use, and with the improvement of fuel-oil processes it appears possible that sharking around the coasts of Africa may become as extensive an industry as whaling is in some parts of the world.

Chemical Industry in Portugal

The United States Bureau of Foreign and Domestic Commerce has just issued a Trade Information Bulletin (No. 760), relating to the chemical industry and trade of Portugal. This is the latest of the series of trade bulletins on world markets for United States chemicals and allied products. While Portugal is primarily an agricultural country, it is believed that it offers possibilities for the sale of greater quantities of chemicals than is now the case. A wider use of fertilisers, insecticides, fungicides, and all agricultural chemicals, for instance, would produce better crops, increase the country's prosperity, and create a demand for other finished products such as paints, varnishes, and toilet preparations. The present report discusses Portugal's exports and imports of chemical and chemical products and the domestic manufacture of chemicals. Copies may be obtained from the Superintendent of Documents, Washington, D. C., at 10 cents per copy.

British Overseas Chemical Trade in August

A Further Decline in Exports

EXPORTS of chemicals, drugs, dyes and colours during August, as revealed by the Board of Trade returns for British overseas trade, amounted to a total of £1,117,125, which is £398,653 lower than in August, 1930. Imports totalling £1,058,011 were lower by £136,658, and re-exports totalling £51,737 were lower by £17,401, as compared with August, 1930.

The statistics for exports and imports during each of the past seven months are set out below, showing percentage fall or rise calculated on figures for the corresponding months of last year.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Exports ..	—36·5	—40·5	—30·5	—19·4	—15·4	—19·0	—21·5	—26·3
Imports ..	—22·7	—11·3	—13·2	+ 4.8	—16·4	— 8·8	—11·4	—11·5

For the first eight months of the present year exports have dropped £3,725,980 and imports have dropped £1,079,940 below the figures for the corresponding period of 1930.

Imports

	Quantities Month ended August 31.		Value Month ended August 31.	
	1930.	1931.	1930.	1931.
CHEMICAL MANUFACTURES AND PRODUCTS—			£	£
Acetic anhydride ..cwt.	216	453	687	1,343
Acid, Acetic.......tons	1,133	760	43,791	26,426
Acid, Tartaric ....cwt.	3,059	3,633	18,640	16,671
Bleaching materials ..	9,061	8,334	8,769	9,037
Borax............ ..	22,956	28,956	13,805	17,294
Calcium carbide	71,727	89,536	44,445	54,802
Coal tar products, not elsewhere specified value	—	—	26,969	1,413
Glycerine, Crude ..cwt.	1,717	1,113	2,661	1,315
Glycerine, Distilled ..	1,498	1,641	3,335	3,302
Red Lead and Orange Lead ....cwt.	3,626	3,824	5,556	4,759
Nickel Oxide	171	85	891	365
Potassium Compounds—				
Nitrate (saltpetre) cwt.	6,409	6,866	5,960	5,648
All other compounds ..	450,556	447,730	165,576	179,019
Sodium Nitrate	24,403	51,760	11,777	22,190
All other Compounds ..	28,165	36,039	18,105	21,403
Tartar, Cream of	1,764	1,421	7,455	5,679
Zinc Oxide ....Tons	672	583	18,307	13,168
All other sorts .....value	—	—	242,108	247,452
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .... oz.	58,779	37,267	4,167	3,296
Bark Cinchona (Bark Peruvian, etc.) ..cwt.	859	416	3,261	1,915
All other sorts ...value	—	—	135,637	104,625
DYES AND DYE-STUFFS—				
Intermediate Coal Tar Products ....cwt.	63	71	690	863
Alizarine	6	—	370	—
Indigo, Synthetic	—	—	—	—
Other sorts	4,277	3,641	98,859	88,634
EXTRACTS FOR DYEING—				
Cutch ....cwt	6,496	2,461	12,777	4,097
All Other Sorts	922	1,009	3,872	3,482
Indigo, Natural	2	—	60	—
Extracts for Tanning (solid or liquid) cwt.	111,375	86,052	114,380	71,071
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground ..cwt.	45,854	37,865	9,784	7,018
White Lead (dry).. ..	11,925	[illegible]	19,617	22,99
All Other Sorts.... ..	123,354	94 397	152,358	119,425
Total of Chemicals, Drugs, Dyes and Colours ....value	—	—	1,194,669	1,058,011

Exports

	Quantities Month ended August 31.		Value Month ended August 31.	
	1930.	1931.	1930.	1931.
CHEMICAL MANUFACTURES AND PRODUCTS—			£	£
Acid, Sulphuric ...cwt.	7,323	3,275	2,349	2,312
Acid, Tartaric	825	628	5,231	3,061
Ammonium (Chloride Muriate) ....tons	353	206	6,166	3,177
Ammonium Sulphate—				
To Spain and Canaries tons	10,389	5,176	72,494	33,571
,, Italy .... ,,	345	130	3,290	789
,, Dutch East Indies tons	744	485	5,548	3,493
,, China (including Hong Kong) tons	5,042	3,312	38,043	23,238
,, Japan...... .. ,,	1,498	4,027	11,109	23,850
To British West India Islands and British Guiana tons	726	290	5,275	1,959
,, Other Countries tons	17,580	6,939	123,352	45,316
Total....... ,,	36,324	20,359	259,111	132,216
Bleaching Powder (Chloride of Lime) .....cwt.	46,416	44,186	13,403	12,188
COAL TAR PRODUCTS—				
Anthracene ....cwt.	3	—	2	—
Benzol and Toluol galls.	6,602	1,861	631	189
Carbolic Acid (Crude) cwt.	439	11,488	710	814
Carbolic Acid (Crystals) cwt.	538	2,067	1,872	4,804
Cresylic Acid..... galls.	93,533	56,787	11,573	6,245
Naphtha......... ,,	2,738	6,265	301	626
Naphthalene (excluding Napthalene Oil) cwt.	1,765	8,299	859	2,014
Tar Oil, Creosote Oil, etc............galls.	504,876	406,597	9,483	8,230
Other Sorts ....cwt.	24,668	4,907	12,630	5,556
Total......value	—	—	38,061	28,478
Copper, Sulphate of tons	1,001	611	24,560	10,913
Disinfectants, Insecticides, etc. ....cwt.	31,644	26,598	73,819	69,903
Glycerine, Crude .... ,,	3,096	2,291	5,430	2,115
Glycerine, Distilled .. ,,	5,057	7,986	11,955	19,096
Total ...... ,,	8,153	10,277	17,385	21,211
POTASSIUM COMPOUNDS—				
Chromate and Bichromate ....cwt.	2,018	2,154	3,944	4,339
Nitrate (Saltpetre). ,,	573	1,132	1,095	1,940
All Other Compounds cwt.	3,361	2,519	11,823	7,615
Total	5,952	5,805	16,862	13,894
SODIUM COMPOUNDS—				
Carbonate, including Soda Crystals, Soda Ash and Bicarbonate cwt.	365,088	202,088	96,038	56,223
Caustic .... ,,	166,770	65,297	108,204	49,329
Chromate and Bichromate ....cwt.	2,919	2,591	4,660	4,337
Sulphate, including Salt Cake ....cwt.	105,148	79,448	12,345	8,452
All other Compounds cwt.	49,388	44,959	64,659	51,733
Total ...... ,,	689,313	394,383	285,906	170,074
Zinc Oxide ....tons	271	363	7,782	7,209
Chemical Manufactures all other Sorts....value	—	—	226,697	193,737
Total of Chemical Manufactures and Products ....value	—	—	977,332	659,373
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .... oz.	183,477	262,542	16,962	23,074
All Other Sorts ...value	—	—	187,503	186,813
Total ...... ,,	—	—	204,465	209,887

	Quantities Month ended August 31, 1930.	1931.	Value Month ended August 31, 1930.	1931.
DYES AND DYESTUFFS—				
Products of Coal Tar cwt.	6,249	10,132	67,336	80,400
Other Sorts ...... ,,	18,213	5,310	18,024	4,931
Total ...... ,, ..	24,462	15,442	85,360	85,331
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground ..cwt.	98	1,476	51	681
White Lead (dry) . ,,	2,637	1,376	4,916	2,193
Paints and Colours in Paste Form .....cwt.	27,347	16,802	52,487	28,033
Paints and Enamels Prepared (including Ready Mixed) ..cwt.	37,671	26,955	117,033	77,895
All Other Sorts.... ,,	44,397	31,048	74,134	53,732
Total ...... ,,	112,150	77,657	248,621	162,534
Total of Chemicals, Drugs, Dyes and Colours ...value	—	—	1,515,778	1,117,125

Re-exports

CHEMICAL MANUFACTURES AND PRODUCTS—			£	£
Acid, Tartaric ....cwt.	48	63	308	349
Borax .... ,,	2,174	13	1,241	7
Coal Tar Products, not elsewhere specified value	—	—	12,862	6,618
Potassium Nitrate (Saltpetre) ....cwt.	81	60	106	88
Sodium Nitrate ... ,,	581	502	298	256
Tartar, Cream of .. ,,	285	439	1,458	1,693
All Other Sorts ..value	—	—	12,796	12,717
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .... oz.	2,225	5,402	237	488
Bark Cinchona (Bark Peruvian, etc.) ..cwt.	191	527	1,860	3,087
All Other Sorts ..value	—	—	26,682	21,600
DYES AND DYESTUFFS—				
Extracts for Dyeing—				
Cutch ....cwt.	1,796	355	3,756	565
All Other Sorts ... ,,	83	73	765	299
Indigo, Natural ... ,,	2	—	50	—
Extracts for Tanning ,,	3,085	2,181	3,812	2,147
PAINTERS' COLOURS AND MATERIALS......cwt.	834	594	2,767	1,696
Total of Chemicals, Drugs, Dyes and Colours ...value	—	—	69,138	51,737

Extended Uses for Beryllium

THE desirable properties of beryllium, which has received so much recent publicity, are now being exploited by The Siemens Co. at the manufacture of springs which retain their elasticity even in red heat. Ferrous alloys containing 1 per cent. beryllium, 12 per cent. chromium and more than 8 per cent. nickel are used. Compared with the best tungsten special steels with high creep limit, these beryllium steels are said to have a temperature advantage of 50° to 100° C. Considerable research is also being carried out in Canada on the utilisation of beryllium in alloys and as a deoxidising agent in the production of copper of high electric conductivity.

Municipal College of Technology, Manchester

THE prospectus of the Municipal College of Technology, Manchester, for the Session 1931–32, contains lengthy details of University courses in the departments of applied chemistry and textile chemistry. The former group embodies courses on general chemical technology, metallurgy and assaying, fermentation processes, electro-chemistry, colouring matters, and foodstuffs; the latter group includes the chemistry of textiles (sizing, dyeing and printing) and paper manufacture. Copies of the prospectus may be obtained on application to the Registrar.

Lautaro Nitrate and Cosach

Preference Shareholders Protest

A PROTEST meeting of the preference shareholders of the Lautaro Nitrate Co., Ltd. (summoned by Gilbert Samuel and Co., solicitors, at the request of a number of English and French preference shareholders), was held at Winchester House, London, on Friday, September 11, to consider the legality of the issue to Guggenheim Brothers of 7 per cent. bonds of Cosach to the nominal value of £5,577,724, and the effect of such issue on the rights and interests of preference shareholders of the Lautaro Nitrate Co., Ltd.

Bonds Secured by Levy on Exported Nitrate

Mr. J. H. Garthwaite, who presided, said that it had been very difficult for shareholders to get at the real state of affairs concerning the foundation of Cosach. A circular was issued in March, 1931, by Mr. E. A. Cappelen Smith, who was a member of the firm of Guggenheim Brothers, president of the Anglo-Chilean Consolidated Nitrate Corporation, president of Cosach, and also chairman of the Lautaro Nitrate Co., showing how Guggenheim Brothers were masters of the situation. In that unique position they had been able to get their personal claims against Anglo-Chilean paid in Cosach secured and preferential bonds. Further, the bonds issued by Cosach to Guggenheim Brothers in payment of a debt due by Anglo-Chilean were secured by a levy or tax of 30s. on every ton of nitrate exported from Chile, whether by Cosach or by other producers which may have kept out of the combine. In short, public taxation had been levied and was being paid by every producer not merely to pay the Government's guaranteed dividends, but the private debts due to Guggenheims by Anglo-Chilean, or, in plainer language, the private debts due to Guggenheim Brothers by themselves.

The bonds issued by Cosach totalled about £25,000,000, of which half was reserved for Guggenheim Brothers and other privileged persons without the slightest legal justification. The yearly amount necessary to provide interest and amortisation was £1,250,000, which had to be levied upon nitrate production. The production of the Lautaro Nitrate Co. now represented probably about 60 per cent. of the whole country's output, and would, therefore, now bear 60 per cent. of the above sum. Such was the extent to which Lautaro was to be mulcted for the payment of the debts of strangers.

The Resolution of Protest

After replying to questions, the chairman moved a resolution stating that while approving the main principle of the centralisation of the Chilean nitrate industry, the preference shareholders protested against the terms and conditions under which that principle had been carried out in the actual formation of Cosach, having regard especially to the fact that the control, but not ownership, of all the companies concerned was admittedly vested in Guggenheim Brothers, and also protested against the taxation (Decree Law No. 12 of February 24, 1931) levied on nitrate exported by the Lautaro Nitrate Co., Ltd., in order to secure bonds issued at the discretion of Cosach in satisfaction of a debt due by the Anglo-Chilean Consolidated Nitrate Corporation to Guggenheim Brothers, and in connection with the purchase by Cosach of assets of other nitrate companies, thus involving grave injustice to the Lautaro company. They also appealed to the Chilean Government to order a full investigation and to remedy the injustice that had been done.

This resolution was carried *nem. con.*

Exhibition of British Optical Instruments

A LOAN exhibition of modern optical instruments manufactured by British firms has been opened on the top floor of the Science Museum, South Kensington, and will continue until the end of the month. The 200 exhibits are in general shown to illustrate the most recent technical achievements of British manufacturers. Demonstrations are being given of a prism interferometer, which shows by means of coloured interference-fringes the degree of optical planeness in glass under test, while a more striking demonstration of the fringes round cracks or strains in imperfect glass is provided by means of a strain-viewer. A projection microscope which magnifies and photographs up to 5,000 magnifications and will take objects for examination up to 50 lb. in weight, is also exhibited.

Chemical Industry Lawn Tennis Tournament

Result of Final Match

Owing to the unfavourable weather conditions it was impossible to play off the final match of the Chemical Industry Lawn Tennis Tournament (organised by The Chemical Age) at the York Gate Tennis Courts, Regent's Park, London, as arranged, on Saturday, September 12. We were, however, fortunate in securing the use of the covered tennis courts at Dulwich, where the tournament was eventually brought to a conclusion with a strenuous match between the final couples, Messrs. S. B. Gane and D. E. Raine, of Johnson, Matthey and Co., Ltd., Birmingham, and Messrs. S. Newman and E. J. Lawrence of *The Industrial Chemist*, London. Messrs. Gane and Raine put up an excellent fight and some exciting play was witnessed, but they were beaten by their rather older and more experienced opponents, Messrs. Newman and Lawrence, who won 6–1, 6–2.

The winners are to be heartily congratulated on their very high standard of play, which has been consistently maintained throughout the tournament. The fact that they have worked through without losing a single set proves their worthiness to become holders of The Chemical Age Challenge Cup.

Messrs. Gane and Raine are to be commended on the enthusiastic spirit shown in carrying through to the end of the tournament, in view of the fact that on no less than three occasions they were obliged to travel from Birmingham to London to play off their matches in the various rounds. An interesting exhibition game, kindly given by Mr. D. E. Raine and Mr. E. J. Lawrence, after the match, was much appreciated by the spectators who had gathered to witness the final contest.

In the absence of Sir Ernest Benn, the Silver Challenge Cup, kindly given by Benn Brothers, Ltd. (proprietors of The Chemical Age), was presented to the winners by the publisher of The Chemical Age, and four miniature cups, generously provided by Graesser-Monsanto Chemical Works, Ltd., were handed to the four finalists.

Very keen interest has been shown throughout the tournament by a large number of chemical firms. Many notes of appreciation have also been received regarding its success and the hope expressed that it will be found possible to arrange a singles championship, as well as doubles, next year.

Magnesium Chloride in India

Protection to Local Industry

During the Session of the Indian Legislature which opened at Simla on Monday, September 7, the Government is introduring a Bill to give protection to the magnesium chloride industry, as it has accepted the recommendation of the Tariff Board for a protective duty of 7 annas (7⅞d.) per cwt. for a period of seven years, at the expiration of which the whole question will be re-examined.

The question of protection for the heavy chemical industry was referred to the Board in the summer of 1928. Though magnesium chloride was not among the chemicals then specified, the Board was entitled by the general tenor of the reference to investigate the position of the industry. A previous inquiry held in the latter half of 1924 led to the conclusion that the conditions laid down by the Fiscal Commission in 1923 for the grant of protection were not fulfilled, it being held that the industry would never be in a position to withstand foreign competition unaided. On the information then available it appeared that the industry, faced by severe competition from Germany, would rapidly succumb. Such, however, has not been the case. Costs have been reduced in several directions and processes improved until, with the assistance of the revenue duty of 15 per cent. *ad valorem*, it appeared that the industry was on the point of being firmly established. In 1922 the output was 1,300 tons; in 1927 it was 2,700 tons.

Report of Tariff Board

The report of the Board, published a few days ago, was reviewed in *The Times Trade Supplement*. It states that during the four years ended in 1928 the average imports of magnesium chloride, classified as such, were about 3,000 tons. The greater part of this was imported into the Bombay Presidency for sizing cotton textiles. The local production during the same period averaged about 2,000 tons. The requirements of the cotton mills in the Bombay Presidency are estimated to be about 4,500 tons a year The capacity of the Pioneer Magnesia Works was about 3,000 tons a year, and there would be no great difficulty in increasing the output, the main requirements being increased storage for the bitterns. Indian magnesium chloride, however, is greyish in colour, whereas the German article is white, but although this difference in colour does not affect the quality, some prejudice on this account exists against the Indian product, especially in the Ahmedabad market, and this tends to restrict its sale.

Chemical Matters in Parliament

Caramel (French Customs Analysis)

In the House of Commons on Tuesday, September 15, Mr. Beaumont asked the President of the Board of Trade whether he is aware that the method of chemical analysis used by the French Customs authorities for ascertaining the percentage of sweetening matter in caramels estimates not only the sugar content but also the protein matter; and whether he will make representations to the French authorities with a view to assimilating their methods of analysis to those used in this country?

Sir P. Cunliffe-Lister: I am aware that difficulties have arisen in connection with the fixing of the percentage of sweetening matter in caramel imported into France from this country, and that the possible inclusion of protein with sweetening matter, owing to the methods followed by the French Customs analysts, is one of the grounds of complaint. The points involved are highly technical, and arrangements were recently made to put certain exporters in this country in direct touch with the French Customs on the matter. On hearing the result of these steps the Board of Trade would be prepared to consider whether they could usefully take any further action.

Hydrogenation of Coal

On Wednesday, September 16, Mr. Baldwin, Lord President of the Council, replying to a question by Mr. T. Smith (Pontefract) as to the continuance of research schemes into the hydrogenation of tar oils and coal decided upon by the late Government, said the schemes for research into the hydrogenation of tar oils and coal referred to by the hon. member are at present under review, together with other work of the Department of Scientific and Industrial Research, in the light of the present economic situation.

Hydrocyanic Acid Gas for Fumigating Purposes

In a report recently published by the United States Public Health Service, the use of various fumigating materials, particularly hydrocyanic acid gas, is discussed. This report indicates that trained fumigators can handle the most deadly gases with safety, both to themselves and others. It is, on the other hand, quite as true that in the hands of careless operatives, many forms of fumigation are a menace to all concerned. The report emphasises that fumigating materials, particularly the deadly gases, should be handled only by persons trained in their use and who have the necessary equipment, such as gas masks, to protect themselves as the occasion requires. Such gases, however, should never be used without the full knowledge and consent of the local public health authorities. Referring particularly to hydrocyanic acid gas, it is stated that this gas should never be used in buildings without combination with a warning gas.

Barium Products in the United States

The total quantity and value of the barium products and chemicals manufactured, or used, in the United States in 1930 shows decreases in comparison with figures for 1929. Combined sales of the barium products and chemicals amounted to 250,712 short tons, valued at $18,793,515, indicating decreases of 16·2 per cent. in quantity and 18·8 per cent. in value, as compared with 1929. Sales of ground barite increased 1·5 per cent. in quantity and 24·7 per cent. in value; sales of lithopone decreased 20·5 per cent. in quantity and 19·7 per cent. in value, and aggregate sales of barium chemicals decreased 18·4 per cent. in quantity and 28·9 per cent. in value.

The Market for Chemicals in Brazil

Imports in Competition with Products of Domestic Manufacture

According to the current number of *Commerce Reports*, which is issued by the United States Department of Commerce, Brazil consumes approximately $50,000,000 worth of chemicals and allied products annually, but offers a much greater undeveloped market.

Taken as a whole, chemicals usually rank about sixth in value among Brazilian imports, their character being confined largely to high-quality finished products and basic chemicals for elaboration in the domestic industry. Other factors influencing both import trade and domestic manufacture are the low native purchasing power, restriction of the Brazilian chemical output largely to the low-priced goods most in demand, a high *per capita* consumption of chemicals in the industrial States, the fluctuating value of the paper milreis in foreign exchange, lack of transportation facilities, and the presence of undeveloped chemical resources.

Although complete returns for the 1930 imports of chemicals and allied products are not yet available, partial statistics confirm the anticipated sharp decline in comparison with the 1929 figure of almost $18,000,000, a decrease, however, accounted for in part by the much lower 1930 exchange value of the paper milreis. Industrial chemicals formed one-third of the total 1929 receipts and serve as an index to the character of the Brazilian chemical market. Pharmaceuticals, paints and varnishes, and toilet preparations were other groups of major importance. The 1929 imports were supplied chiefly by Great Britain, Germany, France, the United States, the Netherlands, Belgium, Italy, Argentina, Switzerland, and Chile.

Industrial Chemicals as Important Trade Factor

Numerous industrial chemicals find a ready market in Brazil as they form the basic materials for many of its domestic manufactures. The textile industry is the leading consumer. Caustic soda, coming chiefly from Great Britain and the United States, is the largest single item in the chemical imports and finds its greatest consumption in the domestic soap and textile industries. The United States and Italy compete for the position of leading supplier of sulphur, utilised in the domestic manufacture of insecticides and sulphuric acid and the refining of sugar. Of the other leading industrial chemical imports, Great Britain and Germany supply most of the potassium and sodium chlorate, and the former also is the chief source for sodium bicarbonate.

Imports of certain industrial chemicals for which preliminary 1930 figures are available are shown in the following table in comparison with statistics for 1929 :—

	1929		1930	
	Kilos	Value Paper milreis*	Kilos	Value Paper milreis*
Caustic soda	16,704,784	11,804,092	17,683,331	14,396,427
Calcium carbide	261,500	175,883	103,044	70,159
Sodium and potassium chlorate	1,126,031	1,369,322	965,982	1,176,291
Sodium bicarbonate	1,298,853	710,718	1,228,069	666,861
Ammonium carbonate	425,676	641,823	222,749	319,787
Sulphur	8,748,516	2,943,445	4,200,019	1,514,710
Calcium chloride	1,258,655	940,976	796,923	543,628
Caustic potash	12,691	38,898	39,841	64,516
Liquid ammonia	204,231	683,254	191,638	651,453
Copper sulphate	1,334,204	1,745,049	482,563	559,604
Magnesium sulphate	650,899	141,782	641,536	143,842
Potassium iodide	7,391	563,785	3,403	258,131
Sodium sulphate	3,843,941	844,773	945,839	262,640
Total	35,877,372	22,603,800	27,504,937	20,628,049

Organic Chemicals and Dyes

Although the market for organic chemical products is limited in most lines, some commodities, such as organic acids, dyes, tanning materials, and glycerine, are imported, while other organic chemical requisites are supplied by the domestic output. A large domestic tanning industry, for instance, offers a market for chemical and vegetable tanning materials and colours. Imports of vegetable tanning materials in 1929 amounted to 4,757,799 kilos, valued at 4,951,017 milreis, remaining at practically the same level as in 1928. Brazil, however, has a considerable supply of vegetable tannin sources. There is also a small market for rubber chemicals and photographic chemicals. There are no pyroxylin plastics manufactured in Brazil but two small factories produce casein plastics and moulded products. Some synthetic resins are consumed by phonograph record manufacturers.

* Value of paper milreis : 1929, $0.118 ; 1930, $0.107.

Dyes find a considerable market in Brazil. Approximately 75 per cent. of the imported and locally produced dyes are used by the textile industry. Cotton mills and other industrial plants buy directly from dye factory representatives domiciled in Brazil ; small cleaning and dyeing establishments from wholesale chemical concerns ; and candy and preserve factories from local dealers or agencies. Only authorised vegetable food colours are permitted to enter Brazil. Some tanning colouring materials also are consumed. Imports of aniline dyes were halved in 1929, to 305,748 kilos, worth 5,408,150 milreis, from 635,724 kilos, valued at 11,006,607 milreis, received in 1928. In order of importance, the Netherlands, Switzerland, Germany, and the United States were the chief sources of the 1929 imports. Indigo and ultramarine blue receipts were recorded in 1929 to the amount of 301,097 kilos and the value of 792,209 milreis, compared with 419,003 kilos and 1,092,255 milreis in 1928.

Chemicals for Match Manufacture

The domestic market for matches is entirely under the control of two companies—the Companhia Brasileira de Phosphoros, with 5 factories, and the Fiat Lux, with 23 factories, both indirectly controlled by the Swedish Match Trust. Among the principal chemical materials consumed, sulphur comes from the United States ; chlorate of potash from Sweden, Germany, and the United States ; glue is locally produced ; phosphorus from Sweden, Germany, and the United States ; colours from Germany and England ; and potassium bichromate from Sweden and Germany.

Acids as an Important Item of Trade

Brazil imports quantities of acids in addition to those produced locally from imported raw materials. Sources of imported acid are as follows : Acetic, Germany and the Netherlands ; tannic, Germany ; tartaric, Germany and Italy ; citric, Italy and Germany ; hydrochloric, Germany ; nitric, Germany ; sulphuric, Germany, the Netherlands, Great Britain and Belgium ; acids, not specified, Germany, the Netherlands, Great Britain, and the United States. Imports of acids are shown in the following table :

	1929		1930	
	Kilos	Value Paper milreis	Kilos	Value Paper milreis
Organic acids :—				
Acetic	91,513	266,199	69,996	197,311
Tannic	14,557	158,661	11,392	134,260
Tartaric	117,601	739,602	87,139	514,475
Citric	125,513	1,170,437	88,609	782,937
Inorganic acids :—				
Hydrochloric	179,691	181,111	16,311	18,006
Nitric	50,112	77,279	6,718	19,800
Sulphuric	808,814	478,300	241,919	226,428
Acids, not specified	786,590	1,418,868	444,375	932,686
Total	2,174,391	4,490,457	966,459	2,825,903

Brazil also offers a steady demand for paints, varnishes, and paint materials, the United States being the leading source for the first two, while Belgium, Great Britain, and Germany are important in the pigment trade. The Brazilian paint industry, with an output of about $1,000,000, however, is a significant factor in the market and most of the raw materials are available locally. There are some exports, dry and prepared paints being shipped to the amount of about 20,000 kilos in 1929, while titanic iron-ore (ilmenite) shipments reached 6,361 metric tons, valued at approximately $65,000, in the same year. Nitrocellulose lacquers for automobiles find a good market in the larger trade centres, along with primers, surfacers, thinners, and solvents.

From Week to Week

THE PIG IRON ASSOCIATION, which was to have come to an end this month, has been extended until the end of March, 1932.

THE NEXT MEETING of the International Steel Cartel, which has to consider the renewing of the Cartel, is fixed for September 30.

A £15,000,000 BID for the alcohol and sugar monopolies of Roumania is rumoured to be the object of the arrival at Bucharest of a party of financiers connected with the Swedish match interests.

ACCORDING to information from Santiago de Chile, the Chilean Minister in Paris has been authorised to open negotiations with the Russian commercial agents relating to the possible exchange of Chilean nitrates for Russian petroleum.

DR. G. C. CLAYTON will represent the Institute of Chemistry at the forthcoming Faraday Celebrations, September 21–October 3, and at the Centenary Meeting of the British Association for the Advancement of Science, September 23–30.

DR. A. E. DUNSTAN, of the Anglo-Persian Oil Co., will represent the Institute of Chemistry at the Eleventh Congress of Industrial Chemistry, which is being organised by the Société de Chimie Industrielle and is to be held in Paris, September 27 to October 4.

THE CHIEF INSPECTOR OF FACTORIES gives notice that Mr. S. Hird is now the Inspector in charge of the Salford district, which comprises part of Manchester, along with Salford, Eccles, Stretford, Swinton and Pendlebury, Urmston and Worsley, and the rural district of Barton-upon-Irwell. Mr. Hird's official address is 72, Bridge Street, Manchester.

SIAM INDUSTRIES, LTD., located at Bangkok, has recently expanded its operations, and in addition to its most important product, soap, is now putting out fertiliser, cattle food and other products. Consequently, an increased consumption of heavy chemicals and allied materials is expected. The company's plant has also been enlarged and modern machinery installed for the manufacture of a greater variety of soap products.

THE ANNUAL CHEMICAL DINNER will be held on Thursday, December 10, at the Connaught Rooms, Great Queen Street, London, W.C.2, at 7 for 7.30 p.m. This will be a social event in which members of the various societies and institutions interested in chemistry are invited to participate. The dinner will be followed by music and dancing. Tickets will be obtainable during October and November, from Mr. F. A. Greene, The Chemical Club, 2, Whitehall Court, London, S.W.1.

VIEWS ON THE ECONOMIC CRISIS will be heard at the centenary meeting of the British Association in London, next week. Sir Josiah Stamp is expected to take part in a discussion on "The Utility of Trade Barometers," and much comment may be provoked by a paper on "Wages, Prices and Employment," by Professor J. H. Jones. Several papers on subjects related to rationalisation are also announced. Sir Robert Waley Cohen, the oil expert, will preside over a discussion on "The Rationalisation of Distribution."

A JOINT MEETING of the Institute of Fuel with the Chemical Engineering Group, the Chemical Society, the Institute of Chemistry, the Institution of Chemical Engineers, the Society of Chemical Industry and other bodies, will be held in the Lecture Theatre of the Institution of Electrical Engineers, Savoy Place, London, W.C.2, on Wednesday, October 7, at 7 p.m., when a paper will be presented by Dr. W. R. Ormandy, and opened for discussion, entitled: "Coal, Smokeless Fuel and Oil from the National Standpoint." The President of the Institute, Sir David Milne-Watson, will preside.

THE DEPARTMENT OF OVERSEAS TRADE announces that, following the recent strengthening of H.M. Trade Commissioner service in Canada and Newfoundland by the creation of an additional Trade Commissioner post at Montreal, arrangements have now been made whereby more frequent visits to Newfoundland and the Maritime Provinces of Canada will be undertaken and greater attention will be paid to the furtherance of United Kingdom trade interests in these areas. Mr. H. F. Gurney, Junior Trade Commissioner at Montreal, has been assigned the duty of making a special study of these questions.

A RESEARCH EXHIBITION in biochemistry has been awarded by St. John's College, Cambridge, to M. C. Franklin, of Canterbury Agricultural College, New Zealand.

TWO PERSONS WERE KILLED and nine badly injured by an explosion in the film coating department of the Eastman Kodak Co., at Rochester, New York, on Friday, September 11.

SWISS COMMERCIAL CIRCLES are following with keen interest the Protectionist movement in England. They are afraid that it will lead to a diminution of the exports of Swiss industries, particularly textiles and chemical products.

IMPORTS OF COPPER SULPHATE into the United States during 1930 were 2,982 short tons compared with 2,694 tons in 1929. Germany was the largest source of supply, with Belgium, United Kingdom, and Canada sending relatively small quantities.

THE GERMAN VISCOSE RAYON SYNDICATE, which also embraces Italian, Swiss, and Dutch firms, will begin its activities on October 1. Negotiations regarding the entry of French and Belgian interests into the syndicate have not yet reached a definite conclusion.

IMPORTERS OF SULPHUR INTO GREECE have recently turned to the United States for their supplies. A shipment of American sulphur received recently was found to be excellent and the price satisfactory. The annual consumption for spraying currant vines in the Patras district is estimated at 10,000 metric tons.

THE NINTH ANNUAL REUNION DINNER, for chemists who served with the Special Brigade R.E., during the war (all ranks), will be held at the Imperial Hotel, Temple Street, Birmingham, on Saturday, October 17. Full particulars can be obtained on application to G. G. Heathcock, "Camelot," Chawn Hill, Stourbridge, Worcs.

CHANGES in the works control of Hadfields, Ltd., Sheffield, include the retirement from active management of Mr. J. P. Crosbie, who retains his seat on the board, and is succeeded in his managerial duties by Mr. Alfred Roebuck, who has been appointed a director of the company. Mr. Roebuck has been chief engineer of the company since 1924.

THAT MORE SAFETY MEN should have been employed in the mine was the opinion expressed in a rider added to the verdict of "accidental death" by the jury at the inquest at Haverton Hill on two men who were fatally injured in a fall of stone at the anhydride mine of the Synthetic Ammonia and Nitrates, Ltd., Billingham, on Tuesday, September 8.

THE INAUGURAL CEREMONY for the Session 1931–32 at the Sir John Cass Technical Institute takes place on Monday, October 5, at 8.15 p.m., when the Rt. Hon. Lord Blanesburgh, Prime Warden of the Worshipful Company of Goldsmiths, will give an address. After the ceremony the several departments of the Institute will be open for inspection by visitors.

AN ANNOUNCEMENT has been made at Welland, Ontario, that the American Manganese Steel Co., of Chicago, one of the largest manufacturers of manganese steel products in the world, is likely to establish a plant in that city. An agreement is stated to have been signed for the purchase of the plant of the Electro-Metallurgical Co., of Canada, Ltd., which is now idle. The American Manganese Steel Co. is a heavy importer of South African manganese ore, and operates seven foundries in various parts of the United States, as well as the Ramapo Iron Works at Niagara Falls.

THE PLANS OF THE SOVIET for the invasion of the Chinese oil market are about to mature as a result of the completion of negotiations by representatives of the Oil Trust in Shanghai, for the immediate introduction of Russian kerosine. Two tankers laden with 2,500,000 gallons of kerosine are awaiting sailing orders at Vladivostok. On a normal trading basis this Soviet kerosene is unlikely to affect the market, for China's consumption is about 20,000,000 gallons a month, but it is pointed out that the entrance into the market of Soviet oil is likely to be followed by dumping, which would create a difficult position.

Obituary

JOSEPH BARNES, F.I.C., youngest son of the late Joseph Barnes, of Dyke Nook, Accrington. Aged 77.

BENJAMIN LODGE ALEXANDER, chief analytical chemist for 34 years to the Scottish Co-operative Wholesale Society Soap Works, Grangemouth.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

349,301. FERTILISERS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, May 24, 1930.

Solid fertilising salts are obtained by spraying the melts or concentrated solutions of compounds of basic nitrates of divalent metals such as calcium, barium, strontium, magnesium, or zinc, with nitrates of monovalent metals or radicles —*e.g.*, nitrates of alkali metals, especially potassium, or of ammonium or urea. The compounds may be formed in aqueous solution or by fusing or sintering the components together. Alternatively, the production of the basic nitrate and the formation of the double nitiate may be effected in one operation—*e.g.*, by causing calcium hydroxide, calcium nitrate, and potassium nitrate to react in aqueous solution.

349,304. DYES AND DYEING. Soc. of Chemical Industry in Basle, Basle, Switzerland. International Convention date, May 25, 1929.

Complex metal compounds of azo dyestuffs, applicable for dyeing animal, vegetable and regenerated cellulose fibres, are obtained by treating azo dyestuffs of the type *o*-oxyamine or *o*-carboxyamine (alkaline), an N-substituted-2:5:7-aminonaphtholsulphonic acid, with one or more agents yielding metal and with a nitrosating agent, the metallisation and the nitrosation being effected in either order. The nitrosation of the metallised dyestuffs may also be effected, if desired, in the dyebath or on the fibre. Examples are given of the production of various dyestuffs and of the dyeing processes for ordinary or weighted silk, cotton and viscose silk.

349,325. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, June 7, 1929.

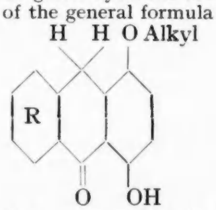
Acid wool dyes are obtained by sulphonating amino-and alkylamino-dianthraquinonylamines by means of oleum containing boric acid and mercury or an oxide or salt thereof, preferably at 120–150° C. The products are more highly sulphonated and more soluble than those obtained by the use of oleum with or without boric acid (cf. Specification 201,575. (See THE CHEMICAL AGE, Vol. IX, p. 377).

349,339. STABLE DIAZO PREPARATIONS. Soc. of Chemical Industry in Basle, Basle, Switzerland. International Convention date, June 17, 1929.

Diazo preparations suitable for use in ice-colour dyeing and painting processes are made by precipitating diazo solutions by means of aromatic sulphonic acids in presence of salts of metals of the second group of the periodic system, preferably salts of magnesium. Specified sulphonic acids are those of benzene, toluene, chlorobenzene, chlorotoluene and naphthalene.

349,361. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, July 16, 1929.

Fast greenish-blue to green dyestuffs are obtained by condensing a compound of the general formula :



(in which the nucleus R may be substituted) with an isatin-α-derivative. The α-anthrone compounds of the above formula used as starting materials are obtainable from the reduction products of acylated 1:4-dihydroxyanthraquinones (cf. Specification 340,639) by treatment with an alcohol in presence of a mineral acid. Examples are given.

349,409. POTASSIUM ACID PHOSPHATE. Kali-Forschungs-Anstalt-Ges., 5, Schönebergerstrasse, Berlin. International Convention date, October 25, 1929. Addition to 327,885 (see THE CHEMICAL AGE, Vol. XXII, p. 581).

The process of the parent Specification is modified in that phosphoric acid and potassium chloride are introduced in equimolecular quantities into a solution saturated with monopotassium phosphate and the acid salt KH_2PO_4, H_3PO_4, and that the solution is boiled to expel hydrochloric acid, the water content being maintained constant by adding water or steam, whereafter the solution is cooled and the mother liquor, separated from the precipitated monopotassium phosphate, is employed for further decompositions. The process may thus be worked continuously.

349,461. VULCANISATION ACCELERATORS. Dunlop Rubber Co., Ltd., 32, Osnaburgh Street, London. D. F. Twiss and F. A. Jones, Fort Dunlop, Erdington, Birmingham. Application date, February 22, 1930.

Vulcanisation accelerators are obtained by condensing mercapto benzothiazole, dithiocarbamates or their analogues with aliphatic radicals substituted by an aromatic nucleus and carrying a reactive halogen in the aliphatic chain. Several examples are given.

349,470. HYDROCARBONS. H. D. Elkington, London. From Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, 30, Carel van Bylandtlaam, The Hague. Application date, February 26, 1930.

Aromatic hydrocarbons are treated at high temperature and pressure with hydrogen in the presence of a molybdenum compound in colloidal state mounted on absorption carbon or finely divided coal. Hydrogenated products are obtained at 400°–450° C., but at 500° C. both splitting and hydrogenation take place. Examples are given of the production of benzene from lubricating oil and tetrahydronaphthalene from naphthalene.

349,490–1. ACETONE. H. Wertheim, 10, Eroicagasse, Vienna, and W. Pollak, Olmütz, Czecho-Slovakia. International Convention date, February 23, 1929.

349,490. Acetone and butyl alcohol are obtained by fermenting carbohydrates with bacteria of the species B. Amylobacter A.M. and Bredemann, which have been habituated by cultivation to increasing amounts of acid. An example is given.

349,491. In this case the carbohydrates are acidulated prior to fermentation by the addition or fermentative generation of non-volatile organic acids, *e.g.*, lactic acid, to prevent contamination during fermentation. Buffer mixtures are also added.

349,499. SYNTHETIC RUBBER. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 24, 1930.

Emulsions of diolefines are polymerised in presence of chlorinated hydrocarbons, chlorine-containing aldehydes, acetals, alcohols, acids, and salts containing chlorine. The emulsifying agents may be soaps, alkyl-aryl sulphonic acid salts, salts of sulphonated oils or organic bases with organic or inorganic acids, etc. In an example, butadiene and hexachlorethane are emulsified with sodium stearate and polymerised. Various other examples of polymerisation are given.

349,575. CYCLIC HYDROCARBONS. F. Uhde, 79, Rathenauallee, Dortmund, Germany. International Convention date, March 6, 1929. Addition to 339,317.

Phenols are treated at or above 400° C. with finely divided or spongy iron and water, at a pressure about 200 atmospheres. Phenol yields cyclo paraffins and condensation products, the portion boiling above 360° C. being suitable as a lubricant. Higher homologues of phenol yield products resembling terpene hydrocarbons. Condensation products may be avoided by adding tar oils, etc., to the phenols. An example is given of the treatment of cresol to obtain 30–40 per cent. of hydrocarbons boiling up to 180° C.

349,600. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 24, 1930.

One molecular part of a 1 : 8-aminonaphthol mono- or di-sulphonic acid is coupled with two molecular parts of diazotised nitro- or acylamino-amines of the benzene series of which at least one carries a hydroxy, carboxy, or other group in

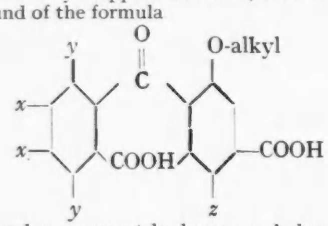
o-position to either of the nitrogenous groups. The nitro and acylamino are converted into amino groups by reduction and saponification, the product tetrazotised and coupled with two molecular parts of components each carrying two auxochrome groups, *e.g.*, amino, alkylamino or hydroxy, in *m*-position to each other. In an example, the nitro groups of the dyestuff 5-nitro-2-aminoanisol→(acid) 1 : 8-aminonaphthol-4 : 6-disulphonic acid (K-acid) (alkaline)←5-nitro-2-aminoanisol are reduced with sodium sulphide, and the diaminodisazo product tetrazotised and coupled (alkaline) with two molecular parts of *m*-aminophenol. The product gives reddish-black dyeings on vegetable fibres, becoming greener and faster on treatment with formaldehyde and copper sulphate.

349,609. DYES. Durand and Huguenin Akt.-Ges., 40, Fabrikstrasse, Basle, Switzerland. International Convention date, March 1, 1929.

These dyes are obtained by oxidation in an alkaline medium by chloride of lime or permanganate, of aminoazo dyes of the type $R_1-N=N-R_n-NH_2$, or of aminopolyazo dyes of the type $R_1-N=N-R_2-N=N-R_3 \ldots N=N-R_n-NH_2$ in which R_2 is a benzene nucleus containing an *o*-carboxy grouping with the OH group in *p*-position to the azo group, R_2, R_3, etc., are benzene nuclei connected by azo groups and may be substituted by sulphonic or carboxy groups, and R_n is a benzene nucleus which may carry substituents such as sulphonic or carboxy groups in addition to the amino group which is in *p*-position to the azo linkage. In an example, diazotised *p*-nitraniline or diazotised *p*-aminoacetanilide is coupled with salicylic acid and the nitro group reduced or the acetylamino group hydrolysed and the aminoazo dyestuff oxidised and sulphonated to obtain a dyestuff giving fast brown-yellow dyeings on chrome-mordanted fibre. Other examples are given.

349,635. DYE INTERMEDIATES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 4, 1930.

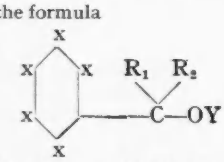
A compound of the formula



in which *x* and *y* represent hydrogen or halogen, at least one *y* being hydrogen and *z* indicates hydrogen, hydroxy or halogen, is treated with strong or fuming sulphonic acid in the presence of boric acid, to obtain 1-hydroxy- (or alkoxy-)-anthraquinone-3-carboxylic acids. Examples are given of the treatment of 2^1 - methoxy - benzophenone-2 : 4^1 - dicarboxylic acid, 2^1-methoxy-5^1-chlorobenzophenone-2 : 4^1-dicarboxylic acid, and 2^1 - methoxy - 5^1 - hydroxy - benzophenone-2 : 4^1 - dicarboxylic acid.

349,640. CARBONATES OF AMINO COMPOUNDS. W. W. Groves, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, March 3, 1930.

A compound of the formula



where x represents hydrogen, alkyl, hydroxyl, amino or a substituted amino group, Y represents hydrogen or an alkyl group substituted by an amino group or by an alkylated amino group or by a nitrogen atom forming part of a heterocyclic ring, R_1 represents hydrogen, R_2 represents an alkyl group substituted by an amino group or by an alkylated amino group, or R_1 and R_2 together represent oxygen, is treated with carbon dioxide in suspension in water. Aqueous solutions of the carbonates are obtained.

349,677. DYE INTERMEDIATES. W. W. Groves, London. From I.G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. Application date, March 12, 1930.

1-Methyl-2-amino-4-hydroxybenzene is condensed with aromatic amines not containing nitro, sulphonic, or carboxylic groups in the presence of hydrochloric acid to obtain *m*-hydroxy-diphenylamine derivatives.

349,444. CATALYTIC AGENTS. Gas Light and Coke Co., Ltd., and R. H. Griffith, 84, Horseferry Road, London. Application date, January 25, 1930.

Hydrocarbons are dehydrogenated, polymerized or condensed in the presence of titanium, tungsten or chromium catalysts with promoters consisting of metals of groups 2, 3, 4, 6, and 7, silicon and boron. The catalyst is made into a paste with a solution or suspension of the promoter, extruded and dried. It is found that over a narrow range of proportions of the promoter, *e.g.*, 2·5 atoms of promoter to 100 atoms of catalyst, the velocity of the reaction is greatly increased.

349,471. HYDROGEN. M. D. Bone, Norton Hall, The Green, Norton-on-Tees, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, February 26, 1930.

Hydrogen, with or without carbon monoxide or nitrogen, is obtained by partial combustion of gaseous hydrocarbons or gases containing them with sufficient oxygen or air to avoid deposition of carbon. The products are passed over coke at 1,200° C., the heat generated in the combustion stage being such that no blowing is necessary to maintain the temperature of the coke. Particulars are given of the amount of oxygen required for methane- and ethane-containing gases. The final mixture may be catalysed with steam to obtain a mixture of nitrogen and hydrogen. An example of the treatment of methane is given.

349,472. REMOVING ARSENIC FROM SULPHURIC AND OTHER ACIDS. Metallges. Akt.-Ges., 45, Bockenheimer Anlage, Frankfort-on-Main, Germany. International Convention date, November 13, 1929.

Washing acid from the contact process is treated with oxy acids of sulphur containing at least two directly linked sulphur atoms, such as thiosulphuric or other poly-thionic acids or their salts, below 60° C. Barium or lead thiosulphates may be used in theoretical quantity, the metals being precipitated as sulphates and the arsenic as sulphide. If the acid contains higher nitrogen oxides, these are removed before the above treatment by treating with sulphur dioxide or air. The purified acid may be used for absorbing sulphur trioxide.

349,475. MOTOR FUELS. L. Rozenstein, 112, Market Street, San Francisco, U.S.A. Application date, November 18, 1929.

An anti-knocking addition to motor fuels consists of a solid or liquid carbon compound having at least one bivalent carbon atom, such as organo-metallo-cyanides, isocyanides, thiocyanates, iso-thiocyanates, cyanates, isocyanates, organic isonitriles, and compounds of the type $\genfrac{}{}{0pt}{}{X}{X}\!\!>\!C=C$, such as di-iodo acetylidene. Some examples are given. Reference is directed by the Comptroller to Specification No. 308,610.

349,527. SPLITTING FATS. Naamlooze Vennootschap Chemische Fabriek Servo and M. D. Rozenbroek, Delden, Twente, Overijsel, Holland. International Convention date, January 22, 1929.

Fat-splitting agents are obtained by sulphonating aliphatic carboxylic acids containing at least 12 carbon atoms or their esters, acid chlorides, anhydrides, polymerization products and oxy- or chlor-derivatives, in the presence of anhydrides of acetic acid and inorganic oxy acids other than sulphuric acid. Esters of fatty acids which may be sulphonated include maize oil, olive oil, whale oil, and linseed oil. In an example, castor oil is treated simultaneously with sulphuric acid and mixed anhydrides of acetic and boric acid. Hydrocarbons may be simultaneously condensed and sulphonated with the fatty acids.

349,566. FERTILIZING SALTS. A. M. Clark and W. K. Hall, Norton Hall, The Green, Norton-on-Tees, Durham, and Imperial Chemical Industries, Millbank, London. Application date, January 29, 1930.

Fertilizers which are normally substantially dry, such as ammonium nitrate, phosphate, and sulphate, calcium nitrate, mixtures of ammonium nitrate and chalk, etc., are prevented from caking by adding 1–5 per cent. of a finely divided insoluble phosphate, *e.g.*, calcium, iron or aluminium phosphate. In an example phosphate rock is treated with sulphuric acid and ammonium sulphate, the precipitated calcium sulphate

removed and the solution neutralised with ammonia. The precipitated iron and aluminium phosphates are employed to prevent the caking of the mixture of ammonium phosphate and sulphate obtained from the neutralised extract.

349,588. LIQUID HYDROCARBONS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, January 23, 1930.

Tars, petroleum residues, cracking residues, pitches, etc., are treated catalytically under pressure in the liquid phase with hydrogen. The tar is first mixed with 20–100 per cent. of tetrahydronaphthalene, decahydronaphthalene, mineral coal tar oil, gas oil, etc., to render it a thin liquid. The catalyst may be oxides, or sulphides, of metals of groups 3—7, ammonium molybdate or chromate, in conjunction with copper, silver, gold, or metals of group 8. A pressure of 50–250 atmospheres and temperature of 350°–430°C. may be employed. An example is given of the treatment of coal tar containing 50 per cent. of pitch. The phenols are largely converted into hydrocarbons and the aromatic hydrocarbons are partly hydrogenated.

Specifications Accepted with Date of Application

355,657. Anthraquinone derivatives, Manufacture of. A. G. Bloxam. (*Soc. of Chemical Industry in Basle.*) April 25, 1930. Addition to 353,932.

355,697. Acid wool dyestuffs of the anthraquinone series, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) April 26, 1930.

355,661. Hydroxythionaphthenes and dyestuffs of the thio-indigo series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. May 18, 1929.

355,662. Dyestuffs of the thio-indigo series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. May 18, 1929. Addition to 355,661.

355,664. Roasting of ores containing iron and copper sulphides. H. K. A. Lassen. May 19, 1930.

355,709. Mono-azo-dyestuffs insoluble in water, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) May 23, 1930.

355,712. Polymerisation products of acrylic acid, its homologues, and derivatives. Rohm and Haas Akt.-Ges. June 1, 1929.

355,715. Aromatic amines, Production of. G. F. Horsley and Imperial Chemical Industries, Ltd. May 27, 1930.

355,716. Acid dyestuffs, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) May 27, 1930.

355,733. Disazo dyestuffs, Manufacture of. Imperial Chemical Industries, Ltd., and R. Brightman. May 22, 1930.

355,743 and 355,810. Acid wool dyestuffs, Manufacture of. W. W. Groves. (*I.G. Farbenindustrie Akt.-Ges.*) May 28 and 29, 1930.

355,792. Aluminium and its alloys, Manufacture of. T. R. Haglund. May 22, 1930.

355,800. Metalliferous dyestuffs, Manufacture of. Soc. of Chemical Industry in Basle. May 28, 1929. Addition to 30,369/1929.

355,808. *o*-Aminothiophenols, Manufacture of. Imperial Chemical Industries, Ltd., and C. H. Lumsden. May 29, 1930.

355,840. Zinciferous materials for the removal of cadmium or cadmium together with lead, Treatment of. New Jersey Zinc Co. October 15, 1929.

355,857. Purification of waxes. I.G. Farbenindustrie Akt.-Ges. June 12, 1929.

355,832. Sulphur from gases, Collection of. A. M. Clark and Imperial Chemical Industries, Ltd. May 31, 1930.

355,861. Separation of carbon monoxide from mixed gases containing hydrogen. Oesterreichisch Amerikanische Magnesit Akt.-Ges. June 18, 1929.

355,866. Alkali metal salts of fatty acids, Manufacture of. H. D. Elkington. (*Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.*) June 19, 1930.

355,867. Catalytic production of amines. Imperial Chemical Industries, Ltd. (*E. I. Du Pont de Nemours and Co.*) June 20, 1930.

355,955. Phosphoric acid and calcium cyanamide, Preparation of. H. Wade. (*International Agricultural Corporation.*) September 1, 1930.

355,970. Para-nitroso-amino-compounds of para-quinone-oxime-imino compounds of the aromatic series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. September 14, 1929.

356,038. Phosphorus and phosphorus oxygen compounds from previously sintered raw phosphates. Metallges Akt.-Ges. November 29, 1929. Addition to 17,314/30.

356,073. Fatty acid esters of cellulose or of derivatives thereof, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 31, 1929.

356,077. Refining of copper. J. Leemans and Soc. Generale Metallurgique de Hoboken. January 8, 1931.

356,089. Cobalt tungsten alloys. Vereinigte Stahlwerke Akt.-Ges. July 4, 1930.

Applications for Patents

[*In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.*]

Abecassis, E. F., Marques, A., and Polleri, M. Preventing incrustation in steam boilers, etc. 25,180. September 8.

Aktiebolaget Separator. Centrifugal separators. 25,411. September 10. (Sweden, September 16, 1930.)

Bakelite Ges. Preparation of resinous condensation products. 25,233. September 8. (Germany, September 9, 1930.)

Bloxam, A. G. (I.G. Farbenindustrie Akt.-Ges.). Manufacture of 2 : 3-amino-naphthol and derivatives therefrom. 25,249. September 8.

Clapham, J. E., and Imperial Chemical Industries, Ltd. Azo pigments. 25,459. September 10.

Clayton, B. Refining oils. 25,103. September 7.

Dehn, F. B. (Deutsche Hydrierwerke Akt.-Ges.). Manufacture of substantive dyestuffs. 25,582. September 11.

Dreyfus, H. Solutions, compositions, etc., having basis of cellulose derivatives. 25,122. September 7.

—— Manufacture of products or articles having basis of cellulose derivatives. 25,123. September 7.

—— Manufacture of oxygenated organic compounds. 25,486. September 11.

—— Manufacture of aliphatic oxy compounds. 25,487. September 11.

—— Manufacture of aliphatic compounds. 25,488, 25,489. September 11.

—— Manufacture of aliphatic compounds. 25,628. September 12.

Du Pont de Nemours and Co., E. I. Manufacture of coloured rubber, etc. 25,056. September 7. (United States, September 15, 1930.)

—— Polymerisation of esters of olefinedicarboxylic acids. 25,186. September 8.

—— Manufacture of coated fabrics. 25,518. September 11. (United States, September 27, 1930.)

Dykstra, H. B. Polymerisation of esters of olefine dicarboxylic acids. 25,186. September 8.

Fairweather, H. G. C. (*Bacon, R. F.*) Recovery of sulphur. 25,104. September 7.

Graham, J. I., and Skinner, D. G. Hydrogenating coal. 25,426. September 10.

Gulf Refining Co. Separation of wax from oily substance. 25,548. September 11. (United States, September 26, 1930.)

Hurrell, G. C. Emulsifying, mixing, and disintegrating machines. 25,152. September 8.

I.G. Farbenindustrie Akt.-Ges Manufacture of aqueous fibroin solutions. 25,443. September 10. (Germany, October 31, 1930.)

Imperial Chemical Industries, Ltd., and Piggott, H. A. Production of fertilizers. 25,299. September 9.

—— Manufacture of alkyl isocyanurates. 25,457. September 10.

—— Manufacture of primary alkylmines. 25,458. September 10.

Johnson, J. Y. (*I.G. Farbenindustrie Akt.-Ges.*). Manufacture of vat dyestuffs of the anthraquinone series. 25,059. September 7.

—— Process for bleaching vegetable substances. 25,405. September 10.

—— Removal of pyridine bases from phenols, etc. 25,524. September 11.

—— Manufacture of printed matter. 25,525. September 11.

—— Production of chlorinated intermediate products for preparation of dyestuffs. 25,619. September 12.

Naugatuck Chemical Co. Treatment of rubber. 25,106. September 7. (United States, September 11, 1930.)

Padovani, C. Simultaneous recovery of phosphorus, etc., and mixtures of hydrogen and carbon-monoxide. 25,092. September 7. (Italy, September 5, 1930.)

Tinker, J. M. Separating 1-naphthylamine-8-sulphonic acid from its isomers. 25,232. September 8.

Urbain, E. Manufacture of ammonium magnesium phosphatic fertilisers. 24,746. September 3. (France, December 2, 1930.)

Vereinigte Aluminium-Werke Akt.-Ges. Treatment of oxide coated aluminium, etc. 24,756. September 3. (Germany, September 25, 1930.)

—— Production of oxide coatings on aluminium, etc. 24,757. September 3. (Germany, September 25, 1930.)

Wade, H. (*Aktiebolaget Kemiska Patenter*). Decomposing raw phosphates. 25,226. September 8.

Wilderman, M. Filter presses. 24,526. September 1.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£17 15s. per ton d/d address U.K. in casks.
ACID CHROMIC.—11d. per lb., less 2½% d/d U.K.
ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.
ACID NITRIC, 80° Tw.—Spot, £20 to £25 per ton makers' works, according to district and quality.
ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.
AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K.
BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
BLEACHING POWDER, 35/37%.—Spot, £7 19s per ton d/d station in casks, special terms for contracts.
BORAX, COMMERCIAL.—Crystals, £13 10s. per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags. carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.)
CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s to £5 5s. per ton d/d station in drums.
CHROMIUM OXIDE.—9d. to 9½d. per lb. according to quantity d/d U.K.
CHROMETAN.—Crystals, 3½d. per lb. Liquor, £18 12s. 6d. per ton d/d U.K.
COPPER SULPHATE.—£25 to £25 10s. per ton.
METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 11d. to 2s. 4d. per gall.; pyridinised industrial, 2s. 1d. to 2s. 6d. per gall.; mineralised, 3s. to 3s. 4d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.
NICKEL SULPHATE.—£38 per ton d/d.
NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
POTASH CAUSTIC.—£30 to £33 per ton.
POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4½d. per lb. nett d/d U.K., discount according to quantity: ground ½d. per lb. extra.
POTASSIUM CHLORATE.—3⅞d. per lb. ex-wharf, London, in cwt. kegs.
POTASSIUM CHROMATE.—8½d. per lb. d/d U.K.
SALAMMONIAC.—Firsts lump, spot, £40 17s. 6d. per ton d/d address in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.
SALT CAKE, UNGROUND.—Spot, £3 10s. per ton d/d station in bulk.
SODA ASH, 58%.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.
SODA CAUSTIC, SOLID, 76/77°E.—Spot, £14 10s. per ton, d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE 97/98%.—£21 per ton.
SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.
SODIUM BICHROMATE CRYSTALS (CAKE AND POWDER)—3½d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ½d. per lb. extra.
SODIUM BISULPHITE POWDER, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade.
SODIUM CHLORATE.—2⅞d. per lb.
SODIUM CHROMATE.—3⅞d. per lb. d/d U.K.
SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.
SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.
SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d.
SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton, d/d in drums. Crystals—Spot, £8 5s. per ton, d/d in casks.
SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4½d. to 6½d. per lb. Crude 60's 1s. to 1s. 1d. per gall. August/December.
ACID CRESYLIC 99/100.—1s. 8d. to 1s. 9d. per gall. B.P., 3s. 6d. per gall. 97/99.—Refined, 1s. 11d. to 2s. 2d. per gall. Pale, 98%, 1s. 7d to 1s. 8d. Dark, 1s. 4d. to 1s. 4½d.
ANTHRACENE OIL, STRAINED (GREEN OIL).—4½d. to 4¾d. per gall.
BENZOLE.—Prices at works: Crude, 7d. to 7½d. per gall.; Standard Motor, 1s. 2d. to 1s. 3d. per gall. 90%.—1s. 3d. to 1s. 4d. per gall. Pure, 1s. 6d. to 1s 7d. per gall.
TOLUOLE.—90%, 1s. 9d. to 1s. 10d. per gall. Pure, 1s. 11d. to 2s. per gall.
XYLOL.—1s. 8d. to 1s 9d. per gall. Pure, 1s. 11d. to 2s. per gall.
CREOSOTE.—Standard specification, for export, 4¾d. to 5d. net per gall. f.o.b.; for Home, 3¾d. per gall. d/d.
NAPHTHA.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 5d. to 1s. 6d. per gall. Solvent, 90/190, 1s. to 1s. 5d. per gall.
NAPHTHALENE.—Purified Crystals, £10 per ton, in bags.
PITCH.—Medium soft, 52s. 6d. per ton, in bulk at makers' works.
PYRIDINE.—90/140, 3s. to 3s. 3d. per gall. 90/160, 3s. 3d. to 3s. 6d. per gall. 90/180, 1s. 9d. to 2s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—
ACID GAMMA.—Spot, 3s 3d. per lb. 100% d/d buyer's works.
ACID H.—Spot, 2s. 3d. per lb 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works
ACID NEVILLE AND WINTHER.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
ACID SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.
BENZIDINE BASE.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL 34·5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. 5d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.
DINITROBENZENE.—7½d. per lb.
DINITROTOLUENE.—48/50° C., 7d. per lb.; 66/68° C., 7½d. per lb.
DIPHENYLAMINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
a-NAPHTHOL.—Spot, 1s. 9d. per lb. d/d buyer's works.
B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.
a-NAPHTHYLAMINE.—Spot, 10½d. per lb. d/d buyer's works.
B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 6½d. per lb., 5-cwt. lots, drums extra, d/d buyer's works.
NITRONAPHTHALENE.—8½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 6d. per lb. 100% d/d buyer's works.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 6d. per lb. d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 3d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £6 10s. to £7 10s. per ton. Grey, £11 to £13 per ton. Liquor, 7d. to 9d. per gall.
ACETIC ACID, TECHNICAL, 40%.—£15 15s. per ton.
ACETONE.—£63 to £65 per ton.
AMYL ACETATE, TECHNICAL.—85s. to 95s. per cwt.
CHARCOAL.—£5 10s. to £9 per ton, according to grade and locality.
IRON LIQUOR.—24°/30° Tw., 9d. to 1s. 2d. per gall.
METHYL ACETONE, 40/50%.—£43 per ton.
RED LIQUOR.—16° Tw., 7½d. to 9d. per gall.
WOOD CREOSOTE.—9d. to 1s. 6d. per gall., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 4d. to 3s. per gall., according to quantity. Solvent, 3s. 6d. to 4s. per gall.
WOOD TAR.—£4 to £6 per ton.
BROWN SUGAR OF LEAD.—£30 to £32 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 1d. per lb according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.
ARSENIC SULPHIDE, YELLOW.—1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £7 10s. per ton, according to quality.
CADMIUM SULPHIDE.—3s. 3d. to 3s. 6d. per lb.
CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.
CARBON BLACK.—3d. to 4d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity drums extra.
CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 6d. per lb.
INDIARUBBER SUBSTITUTES, WHITE.—4d. to 5½d. per lb.; Dark, 4d. to 4½d. per lb.
LAMP BLACK.—£27 per ton.
LITHOPONE, 30%.—£18 to £20 per ton.
SULPHUR.—£9 10s. to £13 per ton.
SULPHUR CHLORIDE.—4d. to 7d. per lb., according to quality.
SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.
SULPHUR PRECIP. COMMERCIAL.—£40 to £45 per ton.
VERMILION, PALE OR DEEP.—6s. 2d. to 6s. 8d. per lb.
ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACETANILIDE.—1s. 4d. to 1s. 6d. per lb.
ACID, ACETIC, PURE, 80%.—£35 5s. per ton d/d address U.K. in casks.
ACID, ACETYL SALICYLIC.—2s. 7d. to 2s. 9d. per lb., according to quantity.
ACID, BENZOIC B.P.—1s. 10d. per lb., for synthetic product. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—10½d. per lb., less 5%.
ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. for 28-lb. lots; Resublimed, 8s. 6d. per lb. for 28-lb. lots, d/d.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—10½d. per lb., less 5%.
AMIDOL.—7s. 6d. to 11s. 3d. per lb., according to quantity.
AMMONIUM BENZOATE.—3s. 6d. per lb.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5-cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ATROPHINE SULPHATE.—7s. to 7s. 6d. per oz., according to quantity.
BARBITONE.—5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—2s. 10d. per lb.
BISMUTH CARBONATE.—7s. 9d. per lb.
BISMUTH CITRATE.—8s. 7d. per lb.
BISMUTH SALICYLATE.—7s. 11d. per lb.
BISMUTH SUBNITRATE.—6s. 9d. per lb.
BISMUTH NITRATE.—Cryst. 5s. 6d. per lb.
BISMUTH OXIDE.—10s. 9d. per lb.
BISMUTH SUBCHLORIDE.—10s. 5d. per lb.
BISMUTH SUBGALLATE.—7s. 9d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb. Liquor Bismuth B.P., in W. Qts., 1s. 2½d. per lb.; 6 W. Qts., 1s. per lb.; 12 W. Qts., 10½d. per lb.; 36 W. Qts., 10d. per lb.
BORAX B.P.—Crystal, £21 10s. per ton; powder, £22 per ton; for one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 4½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 7d. per lb. Prices for 1-cwt. lots.
CAFFEIN, PURE.—6s. 6d. per lb.
CAFFEIN CITRAS.—5s. per lb.
CALCIUM LACTATE.—B.P., 1s. 1½d. to 1s. 3d. per lb., according to quantity.
CAMPHOR.—Refined flowers, 2s. 8d. to 2s. 10d. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—2s. 11½d. to 3s. 1½d. per lb.
CHLOROFORM.—2s. 4d. per lb.
ETHERS.—S.G. ·730—1s. 1d. to 1s. 2d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—30s. per cwt., in barrels, ex wharf.
GLUCOSE, MEDICINAL.—1s. 6d. to 2s. per lb. for large quantities.
HEXAMINE.—1s. 10d. to 2s. per lb., according to quantity.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
HYDROQUINONE.—4s. 7d. per lb. in 1-lb. lots; 3s. 5¾d. per lb. in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 11d. to 3s. 4d. per lb.; potassium, 3s. 2d. to 3s. 7d. per lb.; sodium, 3s. 1d. to 3s. 6d. per lb.; for 28-lb. lots.
IRON AMMONIUM CITRATE.—B.P., 1s. 9d. per lb., for 28-lb. lots. Green, 2s. 6d. per lb., list price. U.S.P., 2s. 7d. per lb. list price.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8¼d. to 8¾d. per oz.
MAGNESIUM CARBONATE.—Light B.P., 36s. per cwt.
MAGNESIUM OXIDE.—Light Commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 13s. 6d. per lb. net; Synthetic, 8s. 6d. to 12s. per lb.; Synthetic detached crystals, 8s. 6d. to 9s. 9d. per lb., according to quantity; Liquid (95%), 8s. per lb.
MERCURIALS B.P.—Up to 1-cwt. lots, Red Oxide, crystals, 7s 4d. to 7s. 5d. per lb., levig., 6s. 11d. to 7s. per lb.; Corrosive Sublimate, Lump, 5s. 10d. to 5s. 11d. per lb., Powder, 5s. 3d. to 5s. 4d. per lb.; White Precipitate, Lump, 5s. 10d. to 5s. 11d. per lb., Powder, 5s. 11d. to 6s. per lb.; Calomel, 6s. 3d. to 6s. 4d. per lb.; Yellow Oxide, 6s. 9d. to 6s. 10d. per lb.; Persulph, B.P.C., 6s. 1d. to 6s. 2d. per lb.; Sulph. nig., 6s. 5d. to 6s. 6d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 4d. per lb.
PARAFORMALDEHYDE.—1s. 6d. per lb.
PARALDEHYDE.—1s. 1d. per lb.
PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
PHENOLPHTHALEIN.—5s. to 5s. 2½d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—76s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P., 1s. 7d. per lb. for 28-lb. lots.
POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125-lb. kegs.
POTASSIUM IODIDE.—16s. 8d. to 17s. 9d. per lb., as to quantity.
POTASSIUM METABISULPHITE.—50s. per cwt. d/dLondon, kegs free.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. per oz. for 1,000-oz. lots.
SACCHARIN.—43s. 6d. per lb.
SALICIN.—16s. 6d. to 17s. 6d. per lb., according to quantity.
SILVER NITRATE.—10d. per oz. for 500-oz. lots, sticks, 2d. per oz. extra.
SODIUM BARBITONUM.—8s. 6d. to 9s. per lb. for 1-cwt. lots
SODIUM BENZOATE B.P.—1s 6d. to 1s. 7½d. per lb.
SODIUM CITRATE.—B.P.C. 1911, 1s. 4d. per lb. B.P.C. 1923, and U.S.P., 1s. 8d. per lb. for 28-lb. lots.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. per cwt. net. Crystals, 2s. 6d. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£26 to £28 per ton, according to quantity. Delivered U.K.
STRYCHNINE, ALKALOID CRYSTAL, 2s. per oz.; hydrochloride, 1s. 9½d. per oz.; nitrate, 1s. 8d. per oz.; sulphate, 1s. 9d. per oz., for 1,000-oz. quantities.
TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
THYMOL.—Puriss, 6s. 1½d. to 7s. per lb., according to quantity. Natural, 12s. per lb.
ZINC STEARATE.—1s. 4d. to 1s. 6d. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—8s. 9d. per lb.
AMYL ACETATE.—2s. 3d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL CINNAMIC ALDEHYDE.—8s. 6d. per lb.
AMYL SALICYLATE.—2s. 6d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE ALCOHOL.—1s. 9d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 9d. per lb.
BENZYL BENZOATE.—2s. 2d. per lb.
CINNAMIC ALDEHYDE NATURAL.—10s. 6d. per lb.
COUMARIN.—12s. per lb.
CITRONELLOL.—7s. 3d. per lb.
CITRAL.—6s. per lb.
ETHYL CINNAMATE.—6s. 9d. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—7s. 6d. per lb.
GERANIOL.—6s. to 10s. per lb.
GERANIOL (FROM PALMAROSA).—14s. per lb.
HELIOTROPINE.—5s. 6d. per lb.
ISO EUGENOL.—9s. per lb.
LINALOL (EX BOIS DE ROSE).—5s. 6d. per lb.
LINALYL ACETATE, EX BOIS DE ROSE.—7s. 6d. per lb. Ex Shui Oil, 7s. 6d. per lb.
METHYL ANTHRANILATE.—6s. per lb.
METHYL BENZOATE.—4s. 3d. per lb.
MUSK XYLOL.—6s. 6d. per lb.
PHENYL ETHYL ACETATE.—10s. per lb.
PHENYL ETHYL ALCOHOL.—8s. 3d. per lb.
RHODINOL.—40s. per lb.
SAFROL.—1s. 6d. per lb.
VANILLIN, EX CLOVE OIL.—14s. 6d. to 16s. 6d. per lb. Ex Guaiacol.—13s. to 15s. per lb.

Essential Oils

ANISE OIL.—2s. 6d. per lb.
BERGAMOT OIL.—7s. 9d. per lb.
BOURBON GERANIUM OIL.—17s. 6d. per lb.
CAMPHOR OIL.—White, 90s. per cwt.; Brown, 90s. per cwt.
CANANGA.—Java, 7s. per lb.
CINNAMON OIL LEAF.—4s. per oz.
CITRONELLA OIL.—Java, 2s. 4d. per lb., c.i.f. Pure Ceylon, 2s. per lb.
CLOVE OIL, 90/92%.—6s. per lb.
EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%—1s. 4d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 9s. per lb.
LEMON OIL.—4s. 3d. per lb.
LEMONGRASS OIL.—2s. 9d. per lb.
ORANGE, SWEET.—8s. per lb.
OTTO OF ROSE.—Anatolian, 40s. per oz.; Bulgarian, 60s. per oz.
PALMA ROSA.—8s. 9d. per lb.
PEPPERMINT.—WayneCounty, 7s. 3d. per lb.; Japanese, 4s. 6d. per lb.
PETITGRAIN.—5s. per lb.
SANDALWOOD.—Mysore, 28s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, September 17, 1931.

CONSIDERING the general state of industry the demand for chemical products is not altogether unsatisfactory, and with the exception of metallic chemicals prices show little variation from quotations of the past few weeks.

General Chemicals

ACETONE.—A small but steady volume of inquiry is being received and the amount of business placed is fair. The market is unchanged at £59 to £61 per ton, according to quantity.

ACID, ACETIC.—The demand continues to be freely received and prices are steady at £34 5s. to £36 5s. per ton for 80% technical, with pure material at £1 per ton extra.

ACID, FORMIC.—In steady demand with the forward position firm, and price is unchanged at £36 per ton.

ACID, CITRIC.—Does not show any improvement, the demand being restricted and value is unchanged at about 10½d. per lb.

ACID, LACTIC.—Price remains steady at £38 per ton for 50% by weight pale quality, with larger volume of business offering.

ACID, OXALIC.—Remains a firm market, with a steady demand. Price is firm at £34 per ton in casks, and £35 per ton in cwt. kegs, carriage paid.

ACID, TARTARIC.—There is no improvement in the demand, which is confined to small parcels. Price is quietly steady about 10d. to 10½d. per lb., less 5%.

ALUMINA SULPHATE.—Is unchanged at £7 5s. to £7 10s.

ARSENIC.—There is a more pronounced scarcity for Cornish material, with the market nominal at about £20 to £21 per ton. Continental makes about £19 to £19 10s. per ton.

CREAM OF TARTAR.—Rather a larger volume of business has been on the market, with the price at about 74s. to 75s. per cwt.

COPPER SULPHATE.—Is unsettled and prices are easier at about £18 per ton.

FORMALDEHYDE.—A fair average demand is being received, with the market quiet at about £27 per ton.

LEAD ACETATE.—Is quoted at about £30 15s. per ton for white and £30 per ton for brown, prices having been adjusted in view of reduction in metallic prices.

LITHOPONE.—In quietly steady request at £18 to £22 per ton according to grade and quantity, with steady demand.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb., with the usual discounts for contracts, and moderate demand received.

POTASSIUM CHLORATE.—In a little better demand, with the market unchanged at £28 to 32 per ton.

PERMANGANATE OF POTASH NEEDLE CRYSTALS B.P.—The position is firm, with the market receiving a steady demand at 5¼d. to 5½d. per lb., ex warehouse.

SODA BICHROMATE.—The demand is of a quiet nature, with the market unchanged at 3½d. per lb., with usual discounts for contracts.

SODIUM HYPOSULPHITE.—Photographic crystals in regular demand at £14 5s. per ton and the commercial quality rather slow at about £8 per ton.

SODIUM PRUSSIATE.—The market continues firm at 4½d. per lb. to 5¼d. per lb., according to quantity, and steady demand.

TARTAR EMETIC.—A small demand is coming to hand with the price unchanged at 10½d. per lb.

ZINC SULPHATE.—Steady at about £10 5s. per ton.

Coal Tar Products

THE market for coal tar products remains quiet, and there is no change in prices to report from last week.

MOTOR BENZOL.—Unchanged, at about 1s. 4½d. to 1s. 5½d. per gallon, f.o.r.

SOLVENT NAPHTHA.—1s. 1½d. to 1s. 2d. per gallon, f.o.r.

HEAVY NAPHTHA.—About 11d. to 1s. 0½d. per gallon, f.o.r.

CREOSOTE OIL.—Obtainable at about 3d. to 3½d. per gallon, f.o.r. in the North, and at about 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at about 1s. 6d. per gallon for the 98/100% quality, f.o.r., and at about 1s. 4d. per gallon for the dark quality 95/97%.

NAPHTHALENES are unchanged at about £2 5s. to £2 10s. per ton for the firelighter quality, at about £2 15s. to £3 per ton for the 76/78 quality, and at about £4 per ton for the 76/78 quality.

PITCH.—Remains at 45s. to 47s. 6d. per ton, f.o.b. East Coast port, for forward delivery.

Nitrogen Fertilisers

Sulphate of Ammonia.—Export.—The market for sulphate of ammonia still displays a weakening tendency, and the price has receded to £4 15s. per ton f.o.b. U.K. port in single bags. The transactions during the week appear to have been small. *Home.*—It is reported that merchants are still purchasing for spring delivery, and that many farmers have actually booked their requirements at the current price of £5 10s. per ton, delivered in 6-ton lots to their stations.

Nitrate of Soda.—It is reported that a price scale for the U.K. has been quoted commencing with £7 18s. and ending with a price of £8 6s., delivered in 6-ton lots during the spring. This report awaits confirmation.

Latest Oil Prices

LONDON, September 16.—LINSEED OIL was steady. Spot, ex mill, £15 5s.; September, £12 2s. 6d.; October-December, £13 5s.; January-April, £14 7s. 6d.; May-August, £15 5s., naked. RAPE OIL was dull. Crude, extracted, £25 10s.; technical refined, £27, naked, ex wharf. COTTON OIL was steady. Egyptian, crude, £17 10s.; refined common edible, £20 15s.; deodorised, £23 5s., naked, ex mill. TURPENTINE was quiet. American, spot, 47s.; October December, 38s. per cwt.

HULL.—LINSEED OIL.—Spot, £14; September, £13 10s.; October-December, £13 12s. 6d.; January-April, £14 5s.; May-August, £15, naked. COTTON OIL.—Egyptian crude spot, £17 10s.; edible refined, spot, and technical, spot, £20; deodorised, spot, £22, naked. CASTOR AND COD OIL steady and unchanged. PALM KERNEL OIL, crude, f.m.q., spot, £18 10s., naked. GROUNDNUT OIL, crushed/extracted, spot, £23 10s.; deodorised, spot, £27 10s. SOYA OIL, extracted, spot, and crushed, spot, £16; deodorised, spot, £19 10s. RAPE OIL, crushed extracted, spot, £24 10s.; refined, spot, £26 10s. TURPENTINE steady and unaltered for spot at 46s. per cwt.

South Wales By-Products

THERE is very little change to report in South Wales by-product activities. Business generally is quiet and there are no prospects of any immediate improvement. Pitch continues to have a slow market, most of the business being placed being for small, near-date parcels. Road tar is not in such good demand, but has a fairly steady, moderate call round about 13s. per 40-gallon barrel. Refined tars have only a moderate demand, with values unchanged for coke oven and gasworks tar. Naphthas are slow, solvent having only a small, sporadic call, while heavy has practically no demand. Motor benzol continues to be a strong feature, but creosote is weak. Patent fuel and coke exports are unsatisfactory. Patent fuel prices, for export, are:—19s. to 19s. 9d., ex ship Cardiff; 19s. to 19s. 6d., ex ship Swansea. Coke prices are:—Best foundry, 32s. 6d. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace, 16s. 6d. to 17s. 6d.

Scottish Coal Tar Products

As the road repairing season is now nearing completion distillers are reducing production of refined tar and are giving more attention to coal tar ptich. Already some fair contracts have been placed in pitch for export at satisfactory prices. Water white products show an advance in sympathy with increased duty on petrol.

Cresylic Acid.—Market conditions remain unchanged with quotations fairly steady. Pale, 99/100 per cent., 1s. 5d. to 1s. 6d. per gallon; pale, 97/99 per cent., 1s. 3d. to 1s. 4d. per gallon; dark, 97/99 per cent., 1s. 2d. to 1s. 3d. per gallon; high boiling, 2s. 6d. to 3s. per gallon; all f.o.r. in buyers' packages.

Carbolic Sixties.—While little business can be recorded nominal value is higher at 1s. 2d. to 1s. 4d. per gallon, according to quality.

Creosote Oil.—Some buyers are taking advantage of present prices to cover for many months forward. Specification oils, 2½d. to 3d. per gallon; washed oil, 3¼d. to 3½d. per gallon; gas works ordinary, 3½d. to 3¾d. per gallon; all in bulk quantities.

Coal Ta Pitch is receiving more attention, both at home and abroad. Business has been placed at to-day's level of 45s. per ton f.o.b. Glasgow for export, and 40s. to 42s. 6d. per ton, ex works for home trade.

Blast Furnace Pitch is quiet at controlled prices, viz., 30s. per ton f.o.r. for home trade, 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—The seasonal demand is on the wane but stocks are very low. Value remains steady at 2½d. to 2¾d. per gallon, ex makers' works in buyers' packages.

Blast Furnace Tar.—Unchanged at 2¾d. per gallon f.o.r.

Crude Naphtha.—Supplies are scarce and value is not under 4½d. to 5½d. per gallon according to quality.

Water White Products.—While there is no increased activity makers have increased quotations following the publication of the supplementary budget proposals. Motor benzole, 1s. 3½d. to 1s. 4½d. per gallon; 90/160 solvent, 1s. 2½d. to 1s. 3½d. per gallon; and 90/190 heavy solvent, 1s. 0½d. to 1s. 1½d. per gallon; all ex works in bulk.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.

Glasgow, September 15, 1931.

BUSINESS during the past week in the Scottish heavy chemical market has been fairly steady.

Industrial Chemicals

ACETONE.—B.G.S.—£60 to £63 per ton, ex wharf, according to quantity.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £45 to £56 per ton; pure, £35 5s. per ton; technical, 80%, £34 5s., delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £22 per ton; crystals, £23 per ton; B.P. crystals, £31 per ton; B.P. powder, £32 per ton, in 1-cwt. bags, delivered Great Britain free in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at 3½d. per lb., ex store. On offer from the Continent at 3⅜d. per lb., ex wharf.

ACID, SULPHURIC.—£3 7s. 6d. per ton, ex works, for 144° quality, £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC B.P. CRYSTALS.—Quoted 11d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 10½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted round about £8 10s. per ton, ex store

ALUM, LUMP POTASH.—Now quoted £8 10s. per ton., c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £26 per ton, ex wharf. On offer for shipment from China at about £23 per ton, c.i.f. U.K.

ARSENIC, WHITE POWDERED.—Quoted £23 10s. per ton, ex wharf. Spot material still on offer at £24 per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £9 10s. per ton, c.i.f. U.K. ports. For Continental materials our price would be £8 10s. per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 7s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £29 per ton, ex store. Continental on offer at about £27 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £30 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £38 per ton, carriage paid.

LEAD ACETATE.—White crystals quoted round about £32 to £34 per ton c.i.f. U.K. ports. Brown on offer at about £1 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £9 10s. per ton. ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p. quoted 2s. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4½d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer, £23 10s. per ton ex store. Offered from the Continent at £22 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100% POWDER.—Quoted £26 15s. per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¾d. per lb., ex wharf

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb. ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA, CAUSTIC.—Powdered 98/99% £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums; all carriage paid buyer's station, minimum four-ton lots; for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3½d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Price not yet fixed.

SODIUM PRUSSIATE.—Quoted 5½d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £8 10s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £18 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Detergent Value of Sodium Metasilicate

THE current issue of our American contemporary, *Industrial and Engineering Chemistry*, contains an informative article by Chester L. Baker, of the Philadelphia Quartz Co. of California, Ltd., on the detergent value of sodium metasilicate. Wetting, emulsification, deflocculation, and dissolving power are important considerations which affect the action of all aqueous detergent solutions. Sodium metasilicate is more effective than NaOH, Na_2CO_3, or Na_3PO_4 in wetting glass, but it is also effective in displacing a petroleum oil from a glass surface over a wider range of concentration than the other alkalies mentioned. Solutions of $Na_2SiO_3.5H_2O$ and $Na_3PO_4.12H_2O$ are said to emulsify a light motor oil better than do those of Na_2CO_3 and NaOH, whilst qualitative tests show that solutions of $Na_2SiO_3.5H_2O$ have deflocculating power for bone black of at least the same order of magnitude as $Na_2O{:}3.25SiO_2$, $Na_3PO_4.12H_2O$, Na_2CO_3, and NaOH. Sodium silicate yields solutions of a higher pH value than the other alkalies considered, with the exception of NaOH. Sodium hydroxide is too caustic for many cleaning jobs. A larger proportion of the Na_2O in Na_2SiO_3 is available at an effective pH than in the other alkaline salts considered. A solution of Na_2SiO_3 with sodium stearate gives more suds at all concentrations than does NaOH, Na_3PO_4, and Na_2CO_3.

A Hint to Exporters to Sweden

BRITISH exporters to Sweden are advised by the Swedish Chamber of Commerce of the desirability of holding stocks in the free ports of Sweden from which prompt deliveries may be made to purchasers. It is stated, in a recent circular, that deliveries from England cannot be made with sufficient promptitude to satisfy buyers' requirements. The Swedish buyer prefers not to hold large stocks, and he is enabled to do so by giving comparatively small, but frequent, orders to foreign exporters who maintain stocks in the free ports, from which prompt delivery can be effected. German exporters have been quick to realise the advantages which this procedure brings to them, especially in the case of standard articles such as rubber goods, dyestuffs, paints, varnishes, porcelain, tools, and domestic articles. British exporters are therefore advised to follow this example, as Swedish buyers are now taking advantage of the excellent facilities offered by the free ports of Sweden. Information concerning these ports can be obtained from the Swedish Chamber of Commerce, 14, Trinity Square, London, E.C.3.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, September 17, 1931.

In a marked degree there has been an air of unsettlement in the chemical market here during the past week consequent on the Budget shocks, and traders complain that business in chemicals has been distinctly patchy. Forward buying of any volume has been almost unknown and users in almost all instances continue to restrict new commitments to deliveries over comparatively short periods. On the whole, however, apart from the uncertainty in the metal compounds due to the continued weakness of copper, lead and other non-ferrous metals, values keep up very well, and only a few cases of easiness fall to be recorded.

Heavy Chemicals

With regard to bicarbonate of soda, quotations in this section are well held at round £10 10s. per ton, with current buying interest in the material on moderate lines. Contract deliveries of caustic soda have been called for fairly regularly and prices are firm at from £12 15s. to £14 per ton, according to quality. There is no special feature about the demand for sulphide of sodium, sales this week having for the most part been of small quantities; the 60-65 per cent. concentrated solid material is quoted at round £9 per ton and the commercial quality at £7 15s. to £8. Saltcake meets with a moderate inquiry, with offers in the neighbourhood of £2 15s. per ton. A quiet demand for hyposulphite of soda is being experienced, the commercial grade offering at about £9 per ton and the photographic crystals at from £15 to £15 10s. The demand for phosphate of soda has been quiet but at about £10 per ton for the dibasic material there has been little further alteration in the price position. Prussiate of soda meets with a moderate amount of inquiry at steady prices, these ranging from 4¾d. to 5¼d. per lb., according to quantity. Alkali continues firm at £6 per ton, and a quietly steady movement in this section is reported. Only a comparatively small demand for chlorate of soda has been in circulation, with values at from about £26 to £26 10s. per ton. Bichromate of soda is selling in moderate quantities, quotations being steady at 3⅜d. per lb., less 1 to 2½ per cent.

Caustic potash is variously quoted at from £27 to £27 10s. per ton, with no big volume of business done during the past week. Carbonate of potash is in quiet demand and, at a top figure of £24 per ton, values are not too strong. Bichromate of potash has met with a moderate inquiry at 4¼d. per lb., with chlorate attracting only quiet attention at round £27 10s. per ton. There is a moderate movement of yellow prussiate of potash, offers of which are well held at from 6¾d. to 7¼d. per lb., according to quantity. Permanganate of potash is unchanged at round 5¼d. per lb. for the B.P. grade and 5d. for the commercial, with no particular weight about the demand.

The position of arsenic is much about as it has been of late, offers being somewhat restricted and quotations firm at from £23 to £23 10s. per ton at the mines for white powdered Cornish makes. The demand for sulphate of copper is quiet and the tendency is easy, offers begin at round £18 per ton, f.o.b. Only a quiet trade is passing in the lead products, with white acetate on offer at £32 12s. 6d. per ton in less than ton lots, and brown at £31 12s. 6d.; nitrate is maintained at round £28 10s. per ton. Inquiry for the acetates of lime is restricted and values are easy at about £7 10s. per ton for the brown quality and £12 for the grey.

Acids and Tar Products

There is nothing special to report regarding the demand in the acid section. Citric is quiet and still on the easy side at from 10¼d. to 10½d. per lb., with tartaric still at about 10d. Oxalic acid is fairly steady at £1 14s. 6d. per cwt., ex store, a moderate trade being reported. Acetic acid keeps up at £35 per ton for the 80 per cent. commercial grade, and £49 for the technical glacial.

A fair amount of interest is being shown in pitch, quotations for which are firm at about 52s. 6d. per ton, f.o.b. There has been no appreciable improvement in respect of creosote oil, the demand being quiet, with offers at 3d. to 4¼d. per gallon, naked. Carbolic acid crystals are unchanged at about 5¼d. per lb., f.o.b., crude 60's being quoted at 1s. 2d. to 1s. 2½d. per gallon, naked. Solvent naphtha is on offer at round 1s. 3½d. per gallon, at works.

Company News

Rio Tinto Co., Ltd.—No interim dividend is to be paid on the 425,000 ordinary shares of £5 in respect of the year to December 31, 1931.

Reckitt and Sons, Ltd.—An interim dividend of 5%, less tax, on the ordinary shares for the quarter, has been declared by the directors, payable on October 1.

Thomas Firth and John Brown, Ltd.—The directors announce that they are of the opinion that it is not advisable to pay an interim dividend on the preference shares, in view of the depressed condition of steel industries.

Cooper, McDougall and Robertson, Ltd.—The directors announce that during the current financial year the company's turnover and trading figures have been satisfactorily maintained. Owing, however, to the disturbed state of international finance, they have decided not to pay an interim dividend on the ordinary shares. The half-yearly dividend on the 7 per cent. cumulative preference shares will be paid on September 30.

Shawinigan Water and Power Co.—A dividend of 50 cents per share on the common shares has been declared by the directors for the quarter ended September 30, 1931, payable October 10 to shareholders of record on September 24. For the quarter ended June 30 last, a dividend of 62½ cents was paid. In a statement the directors say that the dividend has been reduced in order to avoid any undue reductions of the company's reserves. The reduction in the dividend effects a direct saving in disbursements of $500,000 in the current year's accounts.

Tariff Changes

Syria.—A recent Decree authorises the duty-free importation into Syria of the following articles for agricultural purposes: Cooper powder (chemical combination of arsenic and sulphur), a remedy for sheep scab; Cooper fluid (phenols, neutral tar oil and other ingredients), a remedy for camel scab and general disinfectant; vermifuge pastilles (sulphate of copper, arsenic and sulphur); remedies for fluke worm (emulsions of tetrachloride of carbon); ecobol for the treatment of liver fluke in sheep.

Peru.—By virtue of recent Decrees, the following articles have been added to the list of goods which may be imported into Peru on payment of a duty of 10 per cent. *ad valorem*, provided that they are for industrial use and are shipped in quantities greater than 500 kilogs.: Citrate of magnesia, extract of amarillo or tannic extract for use as a mordant in dyeing, liquid chlorine for use in the mining industry' tetrachloride of carbon, impure chloride of barium, and ferrocyanide of iron (Prussian blue).

Insecticides and Disinfectants in Brazil

Insecticides and disinfectants find a market in Brazil only partially met by local products, but there is severe competition among foreign producers. The necessity for agricultural insecticides and fungicides is not generally recognised by the farmer, and, as in the case of many other chemical products, the market may be substantially increased through "education" methods. Animal dips are used in Brazil to a considerable extent in combating the prevalent ticks. The 1930 imports of "lysol, creolin, and similar disinfectants" increased to 875,956 kilos, 1,972,160 milreis, from 681,821 kilos, 1,894,109 milreis, in 1929. Practically the entire amount came from Great Britain.

Royal Technical College, Glasgow

Courses in the form of day classes and evening classes at the Royal Technical College, Glasgow, as set out in the Calendar for the Session 1931–32, include general technical chemistry (inorganic and organic), physical chemistry, fuel technology dyes and their application, sugar manufacture, oils and fats, and paints and varnishes. In addition, there are classes in metallurgy, metallurgical chemistry and chemical engineering. The Session commences on September 21. Copies of the Calendar may be obtained on application to the Registrar.

Chemical Products and Key Industry Duty

Renewal of Exemptions under Consideration

THE question of the renewal of the Safeguarding of Industries (Exemption) No. 2 Order 1930, No. 3 Order 1930, No. 1 Order 1931, No. 2 Order 1931, and No. 3 Order 1931, made under Section 10(5) of the Finance Act, 1926, is now under consideration by the Board of Trade.

The articles covered by these Orders which exempt them from duty until December 31, are:—Acid adipinic; acid isobutyl allyl barbituric; acid lactic which satisfies the requirements of the British Pharmacopœia; acid oxalic; acid propionic; amidopyrin (pyramidon; dimethyl-amidoantipyrine); ammonium perchlorate; barbitone (veronal; malonal; malourea; acid diethyl barbituric; diethylmalonylurea; hypnogen; deba); bromural (dormigene); butyl methyl adipate; calcium gluconate (calcium glyconate); celtium oxide; chinoline (quinoline); chinosol; cocaine, crude; dial (acid diallyl barbituric); dicyandiamide; didial (ethyl morphine diallyl barbiturate); diphenyl; diphenyl oxide; dysprosium oxide; elbon (cinnamoyl para oxyphenyl urea); erbium oxide); ethylene bromide; eukodal; europium oxide; furfurol; gadolinium oxide; germanium oxide; glycol ethers; guaiacol carbonate (duotal); holmium oxide; hydroquinone; integrators (planimeter type); R. lead acetate; lead tetraethyl; lipoiodin; lutecium oxide; mercury vapour rectifiers having mercury cathodes; metaldehyde; methyl cyclohexanol methyl adipate; methyl sulphonal (diethylsulphonemethylethylmethane, trional); methylene chloride; neodymium oxide; nickel hydroxide; oxymethyl paraoxyphenyl benzylamine methyl sulphate; papaverine; phenacetin (acetparaphenetidine); phenazone (antipyrine; phenyl dimethylpyrazolone; analgesin; anodynine; dimethyl oxychinizin); phenetidine, para-; phytin; piperazine (diethylene-diamine; dispermin); planimeters; R. potassium chlorate; potassium ethylxanthogenate (potassium xanthogenate); potassium guaiacol sulphonate (thiocol); R. potassium hydroxide (R. potassium caustic; R. potassium hydrate); R. potassium permanganate; praseodymium oxide; pyramidon-veronal; quinine ethyl-carbonate; radium compounds; resorcine (resorcinol); salol (phenyl salicylate); samarium oxide; scandium compounds; sodium ethyl methyl butyl barbiturate; strontium carbonate; strontium nitrate; styracol (guaiacol cinnamate); sulphonal; synthalin; terbium oxide; thulium oxide; urea (carbamide); vanadium-silica compounds specially prepared for use as catalysts for sulphuric acid manufacture; ytterbium oxide; yttrium oxide.

Section 10(5) of the Finance Act, 1926, is as follows:—"The Treasury may by order exempt from the duty imposed by section one of the Safeguarding of Industries Act, 1921, as amended by this Act, for such period as may be specified in the order, any article in respect of which the Board of Trade are satisfied on a representation made by a consumer of that article that the article is not made in any part of His Majesty's Dominions in quantities which are substantial having regard to the consumption of that article for the time being in the United Kingdom, and that there is no reasonable probability that the article will within a reasonable period be made in His Majesty's Dominions in such substantial quantities."

Communications on this matter should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, within one month from September 16.

Chemical Trade Inquiries

These inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

EGYPT.—The Egyptian Ministry of Agriculture is calling for tenders, to be presented in Cairo by November 23, for the supply of 10 tons of calcium arsenate and 10 tons of "Paris Green." (Ref. No. F.X. 1,266.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BROTEX CELLULOSE FIBRES, LTD., London, W. (M., 19/9/31.) Registered September 1, £2,325 (not ex.), etc. further charge (supplemental to charge dated June 18, 1931, and further charges dated August 7 and 19, 1931) to Capt. J. A. Holder, Beaulieu, and others; charged on interest in certain secret processes, etc. *Nil. January 13, 1931.

DRESSEN AND STACQUEZ CHEMICAL MANUFACTURING CO., LTD., London, W.C. (M., 19/9/31.) Registered September 7, series of £11,450 (not ex.) debentures present issue £20; general charge.

Satisfaction

CONSOL PRODUCTS, LTD., Sunbury Common, manufacturers of essences, etc. (M.S., 19/9/31.) Satisfaction registered September 2 £8,350, and premium of £325, registered October 19, 1928 and March 4, and October 11, 1929, and the unissued balance of £1,650 cancelled.

New Companies Registered

AMALGAMATED TRADING CO., LTD.—Registered September 11. Nominal capital, £10,000 in £1 shares. To manufacture and deal in ores, metals, minerals, chemicals, chemical products, fertilisers, fertilising and vegetable products, etc. A subscriber: H. N. Sporborg, 18, Austin Friars, London, E.C.2.

BELSMAN AND CO., LTD.—Registered September 11. Nominal capital, £100 in 1s. shares. Soap manufacturers, refiners of and dealers in oils and oleaginous and saponaceous substances, paraffin, scale, wax, stearine, lubricants of every description, and all articles and substances used in the manufacture of soap, and all waste or by-products and substances resulting therefrom, etc. Directors: L. Weis, The Hern, Beddington Lane, Beddington, Surrey, and M. Belsman.

DELZOVA, LTD.—Registered September 11. Nominal capital, £500 in 1s. shares. Manufacturers of chemicals, chemical solutions, mixtures, compounds, etc. Directors: E. M. Amphett, M.C., 52, The Drive, Fulham Road, London, S.W.6; J. H. Lord.

ELBON OIL CO., LTD.—Registered September 11. Nominal capital, £100 in £1 shares. Manufacturers, refiners, distillers, importers and exporters of and dealers in oils, oleaginous and saponaceous compounds, tallow, glycerine and all other oil-yielding substances, lubricating grease, etc. Directors: E. McKinty, 69, Stour Road, Christchurch, Hants, and F. N. Hornby.

W. GULLIVER AND CO., LTD.—Registered September 14. Nominal capital, £2,000 in £1 shares. Manufacturers of and dealers in varnish, lacquer, paint, colours, oils, chemicals and any materials or articles used in the manufacture thereof, etc. Directors: W. Gulliver, 9, Park Place, Church Road, Leyton, London, E.10, and B. J. Clark.

REGENT CHEMISTS, LTD.—Registered as a "private" company on September 9. Nominal capital, £100,000 in £1 shares. British and foreign pharmacists, chemists and druggists, wholesale and manufacturing chemists, soap manufacturers, etc. A subscriber: B. F. Cope, 32, Gresham Street, London, E.C.2.